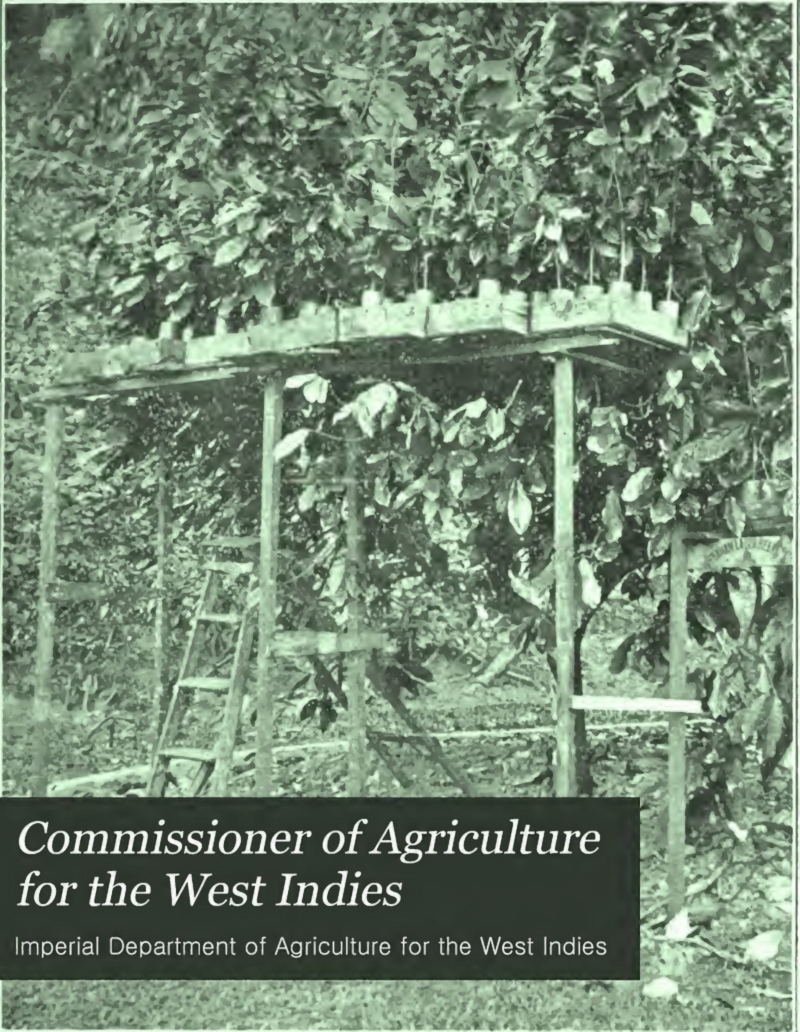

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Agricultural and Reciprocity Conferences.

THE number of representatives appointed to attend the Agricultural and Canadian Conferences in this island from January 14 to January 21 next is estimated at sixty-seven. The number of members to attend the Agricultural Conference will probably be forty-five, while those in attendance at the Canadian Conference will number twenty-two. These figures indicate that the proposals put forward for these Conferences have been very heartily supported by the several Governments and the prospects are distinctly encouraging.

Having regard to the important character of the Conferences and the unusual interest attached to them this year, and in view of the distinguished persons who will be gathered together as accredited representatives of the various Colonies, arrangements are in hand for extending a cordial greeting to the visitors on their arrival at Barbados, and it is evident that every effort will be made during their stay to place such facilities at their disposal as will enable them fully to discharge the important duties entrusted to them.

By the courtesy of the Directors, the Agricultural Conferences will meet in the Assembly Room of the Barbados Mutual Life Assurance Society. This room has already been found convenient for such a gathering, as it was used for a similar purpose in 1902.

It is proposed that the Agricultural Conference will be opened at 4 p.m. on Tuesday, January 14. His Excellency Sir Gilbert Carter, K.C.M.G., has kindly promised to be present and offer a welcome to the distinguished visitors from the other Colonies. The Conference will resume in order to deal with its regular business on Wednesday, January 15, at 11 a.m., and continue from day to day as found desirable.

It is proposed that the Conference on Trade Relations with Canada will be opened on Wednesday morning, January 15, at 10.15 a.m. It should be the universal and fervent hope that at this Conference the deliberations in regard to reciprocal relations between the

Dominion of Canada and these Colonies will bear fruit, good and abundant. It is a good omen that the Dominion Government has shown its sympathy with the objects in view by arranging for the presence of distinguished Canadians to attend the Conference and assist in its deliberations. The Conference is necessarily a preliminary one, but if the circumstances justify it, it is probable that negotiations of a more formal character may be entered upon at a later date.

It is anticipated that arrangements will be made by the Barbados Reception Committee for excursions to the country districts in order to visit some of the most prominent sugar and cotton estates, and a visit also is proposed to the Central Cotton Factory in Bridgetown. Lady Carter has kindly arranged to receive the members of the Conference at Government House on Wednesday, January 15, at 4.30 p.m. A reception will also be given at Chelston by Lady Morris on Friday January 17, at 4.30 p.m.

The Conference Dinner will probably take place at the Marine Hotel on Saturday evening, January 18, at 7.30.

It is anticipated that the business of both Conferences will terminate on Monday, January 20, and the representatives will leave for their several destinations by the Royal Mail Steamers on the following day, January 21.

WEST INDIAN AGRICULTURAL CONFERENCE, 1908.

The following is the list of the Representatives appointed to attend the Agricultural Conference at Barbados, January 14 to January 21, 1908:—

President.

The Hon. Sir Daniel Morris, K.C.M.G., M.A., D.C.L., D.Sc., F.L.S., Imperial Commissioner of Agriculture for the West Indies.

Representatives.

JAMAICA.

The Representative of the Board of Agriculture :—

The Director of Public Gardens and Plantations (The Hon. W. Fawcett, B.Sc., F.L.S.).

The Representative of the Jamaica Agricultural Society :—J. R. Williams, Esq., M.A.

BRITISH GUIANA.

The Government Analyst and Director of Science and Agriculture (Professor J. B. Harrison, C.M.G., M.A., F.I.C., F.G.S.).

The Representative of the Board of Agriculture :—

The Hon. B. Howell Jones.

The Principal, Queen's College (T. A. Pope, Esq., B.A.).

TRINIDAD AND TOBAGO.

The Government Analyst and Professor of Chemistry (Professor P. Carmody, F.I.C., F.C.S.).

The Superintendent of the Royal Botanic Gardens (J. H. Hart, Esq., F.L.S.).

The Inspector of Schools (J. H. Collens, Esq., V.D.).

WINDWARD ISLANDS.

The Representatives of the Grenada Agricultural & Commercial Society : W. Grahame Lang, Esq., and F. Ramsey Harford, Esq.

The Agricultural Superintendent, Grenada (R. D. Anstead, Esq., B.A.).

The Representative of the St. Vincent Agricultural & Commercial Society (The Hon. J. G. W. Hazell)

The Agricultural Superintendent, St. Vincent (W. N. Sands, Esq.).

The Representative of the St. Lucia Agricultural Society : The Hon. E. G. Bennett.

The Inspector of Schools (C. F. Condell, Esq.).

The Agricultural Superintendent, St. Lucia (J. C. Moore, Esq.).

LEEWARD ISLANDS.

The Government Analytical and Agricultural Chemist & Superintendent of Agriculture (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.).

The Representative of the Antigua Agricultural & Commercial Society : A. P. Cowley Esq.

Agricultural and Science Master, Antigua (A. H. Kirby, Esq., B. A.).

The Curator, Botanic Station, Dominica (Joseph Jones Esq.).

The Representatives of the Dominica Agricultural Society (A. B. C. Lockhart, Esq.).

The Representatives of the Dominica Planters' Association :—Ed. A. Agar, Esq., L. Lambert Bell, Esq.

The Agricultural Representative of the Presidency of Montserrat : The Rev. C. W. Johnson.

The Curator, Botanic Station, Montserrat (William Robson, Esq.).

The Agricultural Superintendent, St. Kitt's (F. R. Shepherd, Esq.).

The Representative of the St. Kitt's Agricultural & Commercial Society : The Hon. A. D. C. Adamson.

BARBADOS.

The President of the Education Board : His Lordship the Bishop of Barbados (The Right Revd. W. P. Swaby, D.D.).

The Head-master of Harrison College (The Revd. H. A. Dalton, D.D.).

The Island Professor of Chemistry in Chemical Charge of Sugar-cane Experiments (Professor J. P. d'Albuquerque, M.A., F.I.C., F.C.S.).

The Agricultural Superintendent of Sugar-cane Experiments (J. R. Bovell, Esq., F.L.S., F.C.S.).

The Inspector of Schools (The Revd. Canon Reece).

The Representatives of the Barbados Agricultural Society : The Hon. F. J. Clarke, C.M.G., M.A., (President), the Hon. Forster M. Alleyne, M.A., M.L.C., and the Hon. G. Laurie Pile, M.L.C., (Vice-Presidents), G. Elliott Sealy, Esq., M.C.P., T. W. B. O'Neal, Esq., B.A., M.C.P.

OFFICERS OF THE IMPERIAL DEPARTMENT OF AGRICULTURE FOR THE WEST INDIES.

The Imperial Commissioner of Agriculture for the West Indies (The Hon. Sir Daniel Morris, K.C.M.G., M.A., D.C.L., D.Sc, F.L.S.).

Scientific Assistant (Walter Biffen, Esq., B.Sc.).

Entomologist (Henry A. Ballou, Esq., M.Sc.).

Mycologist and Agricultural Lecturer (F. A. Stockdale, Esq., B.A., F.L.S.).

Travelling Inspector in connexion with cotton investigations (Thomas Thorton, Esq., A.R.C.S.).

Honorary Secretaries to the Conference : F. A. Stockdale, Esq., B.A., F.L.S., and Alleyne Graham Howell, Esq.

Programme of Proceedings

THE PRESIDENT'S ADDRESS.

SUGAR INDUSTRY.

I. Brief Summary of Results of Experiments with Seedling and other Canes, together with Manurial Experiments with Sugar-cane in the West Indies. (*a*) British Guiana, (Prof. J. B. Harrison, C.M.G., M.A., F.I.C., F.G.S.) (*b*) Barbados, (Prof. J. P. d'Albuquerque, M.A., F.I.C., F.C.S. and Mr J. R. Bovell, F.L.S., F.C.S.). (*c*) Leeward Islands, (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.). (*d*) Jamaica, (The Hon. H. H. Cousins, M.A., F.C.S., and the Hon. W. Fawcett, B.Sc., F.L.S.).

II. Root disease of Sugar-cane, (Mr. F. A. Stockdale, B.A., F.L.S.).

III. Some points in connexion with Mechanical Tillage. (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.).

IV. Selective Cane Reaping at Jamaica. See *West Indian Bulletin*, Vol. VIII, p. 109. (Discussion.)

V. Summary of papers on the Polarimetric Determination of Sucrose. (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S., and Mr. H. A. Tempany, B.Sc., F.I.C., F.C.S.).

VI. Results obtained in connexion with the Antigua Sugar Factory, (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S).

CACAO INDUSTRY.

VII. Brief Review of the Results of Experiments with Cacao Trees at Dominica, St. Lucia, and Grenada. (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S., Mr. Joseph Jones, Mr. J. C. Moore, and Mr. Rudolph D. Anstead, B.A.

VIII. The Characters of Criollo Cacao. (Mr J. H. Hart F.L.S.).

IX. Grafting Cacao at Dominica. (Mr. Joseph Jones).

X. The necessity for improving the methods of planting Cacao in the West Indies. (Mr. J. H. Hart. F.L.S.).

XI. Brief Review of the Fungus Diseases of Cacao in the West Indies and the Sanitation of Cacao Orchards. (Mr. F. A. Stockdale, B.A., F.L.S.).

XII. Thrips on Cacao Trees in the West Indies. (Mr. Henry A. Ballou, M.Sc.).

LIME JUICE INDUSTRY.

XIII. Manufacture of Commercial Citrate of Lime (Discussion).

COTTON INDUSTRY,

XIV. Recent results in the Cultivation of Sea Island cotton: (*a*.) Barbados, (Mr. J. R. Bovell, F.L.S.). (*b*) Leeward Islands, (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.). (*c*.) St. Vincent, (Mr. W. N. Sands).

XV. Brief summary of the progress of the Sea Island Cotton Industry in the West Indies (Mr. Thos. Thornton, A.R.C.S.).

XVI. The treatment of Insect Pests of Cotton (Mr. Henry A. Ballou, M.Sc.),

XVII. Brief Statement respecting the Barbados Co-operative Cotton Factory (The Hon. F. J. Clarke, C.M.G., M.A.).

RICE INDUSTRY.

XVIII. The Rice Industry of British Guiana (Prof. J. B. Harrison, C.M.G., M.A., F.I.C., F.G.S.).

RUBBER INDUSTRY.

XIX. Additional information in regard to the Rubber Industry of Trinidad and Tobago (Mr. J. H. Hart, F.L.S.).

AGRICULTURAL CREDIT AND LOAN BANKS.

XX. The Agricultural Bank of Barbados (The Hon. F. J. Clarke, C.M.G., M.A.).

MISCELLANEOUS.

XXI. Timber resources of the West Indies (Discussion).

XXII. Notes on Essential Oils (The Hon. Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S., and Mr. H. A. Tempany, B.Sc., F.I.C., F.C.S.).

XXIII. Observation of Arbor Days in the West Indies, (Discussion).

AGRICULTURAL EDUCATION.

XXIV. Agricultural Education in Secondary Schools and Colleges in the West Indies (Discussion).

XXV. Agricultural Education in Elementary Schools in the West Indies (Discussion).

XXVI. Examination for Certificates on the Theory and Practice of Agriculture (Discussion).

CANADIAN RECIPROCITY CONFERENCE.

The following is the list of Representatives to attend the Conference on Trade Relations with Canada at Barbados, from January 14 to January 21, 1908:—

JAMAICA.

The Collector of Customs & Inspector of Invoices (E. A. Savage, Esq.).

The Representative of the Jamaica Agricultural Society: J. R. Williams, Esq. M.A.

BRITISH GUIANA.

The Comptroller of Customs (D. G. Garraway, Esq.).

The Representative of the Chamber of Commerce: C. G. A. Wyatt, Esq.

TRINIDAD.

The Collector of Customs (The Hon. R. H. McCarthy, C.M.G.)

GRENADA.

The Colonial Secretary (The Hon. Edward Drayton, C.M.G.).

The President of the Grenada Agricultural & Commercial Society (The Hon. C. Macaulay Browne, C.M.G.).

ST. VINCENT.

The Supervisor of Customs (Frank W. Griffith, Esq.).

The Representative of the St. Vincent Agricultural & Commercial Society: Charles J. Simmons, Esq.

ST. LUCIA.

The Colonial Treasurer (The Hon. H. A. Smallwood).

LEEWARD ISLANDS.

The Colonial Secretary (The Hon. E. St. John Branch.)

The Administrator of St. Kitt's Nevis (His Honour T. L. Roxburgh).

The Commercial Representative for the Presidency of of St. Kitt's-Nevis (The Hon. S. L. Horsford).

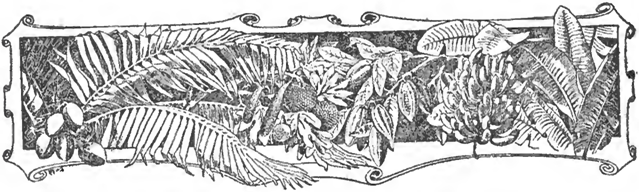
The Administrator of Dominica (His Honour W. Douglas Young, C.M.G.).

BARBADOS.

The Auditor General (The Hon. E. T. Grannum, M.L.C.).

The Representatives of the Barbados Chamber of Commerce: V. Hanschell, Esq. (Chairman), E. I. Baeza, Esq., (Vice-Chairman), Darnley C. DaCosta, Esq., J. Allan Jones, Esq.

The Representatives of the Barbados General Agricultural Society: The Hon. G. A. Goodman, K.C., M.C.P., The Hon. J. Challenor Lynch, M.L.C., S. S. Robinson, Esq., M.C.P., Alistair Cameron, Esq., E. W. Mahon, Esq.



WEST INDIAN FRUIT.

ORANGES IN COLD STORAGE.

The accompanying note on the above subject appeared in the *Transvaal Agricultural Journal* for October last :—

It may be of interest to note that the Transvaal Cold Storage Company has set aside a room for cold storage of fruit at their Pretoria branch. A request was made by one of our leading fruit growers that this division should try to make some such arrangement. It is a pleasure to state that the storage people met the proposal in the most satisfactory manner, and now some thousands of oranges are being kept at a temperature of 40° F., with possibly an occasional variation of one point above or below. The fruit is examined every ten days. The first thirty boxes were put in on July 9, and up to the date of writing (September 1) only five specimens have shown signs of decay. On examination, these five showed cuts in three cases and thorn punctures in two others, pointing out again the necessity for absolutely the greatest possible care in both picking and handling. The fruit is placed in standard boxes (the box holding 2 cubic feet), and the rental per month is 1s. per box, or about 8*d*. per 100. The writer does not look upon this business as an experiment but the growers and storage owners evidently do. The result will probably be that next season the whole of the space will be engaged, instead of only small portion as at present, with the advantage that at a slight outlay for storage, the sale price of the fruit has been increased 100 per cent. in three months.

COLONIAL FRUIT SHOW.

The third show of colonial-grown fruit and vegetables held in London during 1907, under the auspices of the Royal Horticultural Society, was fixed for November, since at that time the products of Canada and the West Indies are found in England in the greatest profusion.

By means of these exhibitions, which have been held each year since 1904, the Royal Horticultural Society is doing an excellent work both in showing the inhabitants of the mother country what splendid and varied supplies of fruit the British Colonies are able to produce and export, and also by affording a means for enabling colonial producers to ascertain which of their fruits are best suited for the home markets.

Reports in the London newspapers refer to the collections of fruit and vegetables at the show of November 28 and 29 last as forming a magnificent display of produce. This description, however, it is to be feared, was elicited more by the contributions from British Columbia, Nova Scotia, and Ontario than by the exhibits sent from the West Indies, which were comparatively small in quantity, although excellent in quality.

The need of educating home consumers to an appreciation of the varied fruit and vegetable products of the West Indies is evident from the manner in which these products were described in the newspaper reports referred to. In many cases they appeared to be regarded as curiosities, but the favourable terms in which the flavour, etc. were described, indicate the possibilities that exist in the way of a British market to growers of tropical produce.

A prominent feature of the West Indian section at the late show was a valuable and varied collection of produce, including nearly all the products of the West Indies, shown by the West Indian Produce Association. This was awarded a gold medal. Another particularly interesting exhibit was a collection of botanical specimens, shown by the Royal Mail Packet Company, and which was awarded the highest prize in its class.

The Norbrook Preserving Company were represented by a varied display of preserves, etc., and much interest was taken by visitors both in this exhibit and in that of Mrs. W. H. Sharpe, of Grenada, who sent a complete collection of preserved fruits and jellies. A feature of Mrs Sharpe's exhibit which attracted special attention was the cacao cheese, made from the pulp of the cacao beans. Although neither of these two exhibitors gained a prize, a gold medal was awarded to the West India Committee for the manner in which they had arranged the exhibits from the colonies represented by them.

Referring to the manner in which the produce was put up for shipment, the *West India Committee Circular* makes special mention of the boxes in which the fruit from Trinidad was packed. They were 13 × 16 inches in size, perforated on two sides, the holes being covered with perforated zinc. Each box contained four trays, in which the fruit was carefully laid, crushing being avoided in this manner. The boxes were much admired by the judges, who, however, feared that such an elaborate packing arrangement would be too expensive for commercial purposes.

At the instigation of the West India Committee a considerable endeavour was made to arouse public interest in the exhibition. It is stated that still greater efforts will be made to popularize the shows of next year (of which full particulars were given in the last issue of the *Agricultural News*), and it is hoped that the Permanent Exhibition Committees will make a joint effort, and indicate by the quantity and quality of the exhibits sent to London, that they appreciate these efforts and are determined to do their best to meet them, and at the same time to improve the trade of the colonies to which they belong.

FRUIT IN QUEENSLAND.

The fruit industry of Queensland would appear to be in a prosperous condition. The area of banana cultivation is undergoing rapid extension, although steps have to be taken to protect the ripening fruit against the ravages of the fruit fly. Growers of citrus fruits have every reason to be contented, and the growing and canning of pine-apples also constitute a developing branch of the industry. The particulars given herewith, have been taken from the *Annual Report*, 1906-7, of the Instructor in Fruit Culture in Queensland:—

Bananas, which suffered so severely in the northern part of the colony from a cyclone, during the beginning of 1906, have now recovered to such an extent that a crop of 1,250,000 bunches will be taken off during the next few months.

In the south, the culture of this fruit remains about the same, though, owing to the fact that the fruit fly does not attack the fruit here, the bunches are allowed to develop properly, instead of being cut half-ripe, with the result that the southern-grown fruit is very superior to that of the north, and sells readily in the local markets.

Steps have already been taken to protect the banana industry, by bringing in a regulation making it compulsory to cover every bunch of bananas with a cheap netting, which has been proved to be an effectual protection against the ravages of the fly.

Pine-apple culture is extending steadily in the southern part of the State, and also in the Cairns district, and a market is found for the increased yield without difficulty, as our local canneries are able to absorb any surplus.

During the year we have conducted experiments for the purpose of determining whether we can turn the waste material from our pine-apple canneries, as well as the small and crippled pines to a profitable use, and as far as can be judged, we have succeeded in doing so. A quantity of small pines were crushed and made into cider, which shows promise of becoming an excellent drink for this climate. An attempt has also been made to preserve the juice of the fruit in a fresh state, without fermentation, and in this we have succeeded. The juice is pressed from the skins and the waste pines, filtered, pasteurized, bottled, and hermetically sealed, and has kept perfectly sound for some six months.

The citrus crop of 1906 was a record for this State, and the bulk of the fruit was marketed in good order, and realized satisfactory prices. The crop of 1907 is also a good one, the quality being excellent, especially in the case of Washington Navel oranges and Lisbon lemons.

PIMENTO GROWING IN JAMAICA.

An interesting account of the methods followed in the growing and preparation of pimento (*Pimenta officinalis*), is contributed by the American Consul at Kingston, to the United States *Consular and Trade Reports* for the month of November.

The particulars given below have been abstracted from the article in question, with a view of supplementing the information on pimento growing which has already appeared in the *Agricultural News* (Vol. IV p. 295).

Jamaica appears to be the only country in the world from which pimento is exported; although an inferior quality of the spice is grown in Mexico, and other parts of Central and South America.

The pimento berries are dark in colour, and about as large as a pea. They possess an odour and flavour resembling a mixture of cinnamon, cloves, and nutmegs, from which the name 'allspice' has been given to them. The pimento tree, which belongs to the myrtle family, attains a height of 30 feet.

The tree flourishes in a wild state, and plantations are readily established by allowing land near pimento trees to become overgrown with bush from which young seedlings spring up, as a result of a large number of seeds deposited by the birds that have been eating the pimento berries. The bush is then cleared, and the pimento trees are allowed to grow up. Most of the plantations in Jamaica were formed in this way. It is stated that the best results are obtained, when a distance of 20 feet is allowed from tree to tree. The trees grow well on a poor soil, when it is fairly light and well drained.

The first crop is yielded when the trees are about seven years old, and after that the crops increase each year until the trees reach maturity, which takes place at about eighteen or twenty years old. The berries, which form the 'allspice' of commerce, grow in clusters on the tree. They are gathered while green, before arriving at the stage of ripeness. The full, but unripe berry is spicy and indeed somewhat peppery. In gathering the berries the process followed is for one person to climb the tree and break off the young branches, which are thrown to the ground, the berries being picked from the stalks by women and children. Ripe berries are kept separate from the green ones. Contrary to what might be expected, this breaking of the branches does not seem to damage the trees, but is stated to afford the necessary annual pruning without which the trees would not bear regularly.

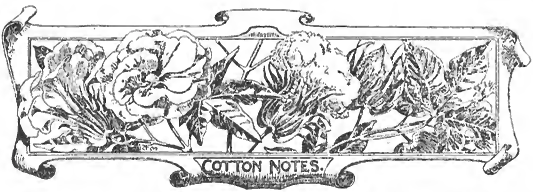
The berries are afterwards put through a drying process, in the same manner as coffee, the process lasting from three to twelve days. This takes place either in the sun or sometimes, in wet weather, by means of an American fruit evaporator. The fruits are known to be sufficiently dry when the seeds rattle on shaking, and are of a dark, spicy colour. In favourable seasons, as much as one hundred weight of dry spice is obtained from a single tree.

When ripe, the pimento berries are of a glossy black colour, sweet and spicy in flavour. If not picked before reaching this stage, such berries are often used to make pimento dram, a native drink. From the leaves of the pimento an essential oil is distilled, which, added to rum, makes bay-rum. The annual average export of pimento from Jamaica is about 75,000 bags, weighing, on an average, 145 ℔. each.

In 1905-6, the Jamaica pimento crop fell short of the average, on account of the heavy and destructive rains which occurred at the time when the berries were forming on the trees, and the 1906-7 crop was again short as a result of the prolonged drought. On account of the continuance of the drought, this year's crop is again expected to be small, and will probably not exceed 40,000 cwt.

As a result, the price of this product is higher than usual, the figure quoted in Jamaica, at the time the Consular report was written, being 21*s*. per 100 ℔., as compared with an average price for many years past of 15*s*. per 100 ℔. It is stated that if more care were taken in the preparation and curing of the spice on the part of the small settlers, their product would command a higher price on the market.

Pimento growing is chiefly carried on in the parish of St. Ann, but considerable quantities are also produced in the parishes of St. Elizabeth, St. Mary, Trelawney, and Manchester.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of December 23, with reference to the sales of West Indian Sea Island cotton:—

Since our last report about 100 bales of West Indian Sea Islands have been sold, chiefly from Barbados and St. Kitts.

The quality continues good and prices are rather firmer. New crop from both islands realized from 20*d.* to 22*d.*, but the sales include some inferior stained cotton, probably the remains of last season's crop.

COTTON REPORTS FROM THE SEA ISLANDS.

In their report of December 14 last, Messrs. Henry W. Frost & Co., of Charleston, give the following particulars with reference to the conditions of the Sea Island Cotton market:—

The sales included all of the crops to be had on the market at below 45c., amounting to 1,300 bales, and all of the odd lots to be had, amounting to about 600 bales, at our quotations of last week (*Agricultural News*, Vol. VI, p. 406). Factors are refusing to sell odd lots, and are waiting until they have accumulated stock. Considerable disappointment has been experienced in regard to the extent of the crop, which it is now thought will probably not reach 12,000 bales.

On December 21, Messrs. Frost write:—

The receipts this week were composed largely of crop lots to be delivered on the sales of the previous week. Odd bags received are beginning to show a considerable falling off in quantity as well as in quality, indicating that the crop has been largely marketed. Owing to their scarcity factors were able to obtain the prices they asked for. The prices of the week were: Extra fine, 23½*d.*; fully fine, 22¼*d.*; fine, 21¼*d.*; fine to fully fine, but not well prepared, 18½*d.*

SEASONABLE NOTES.

Cotton growers will find it worth their while to bear the following practical hints in mind, now that the picking season is in progress:—

Do not allow ripe cotton to remain too long on the plants.

As far as possible, arrange for all the pickers to go together to one field; this enables a more strict watch to be kept on the cotton picked, and on the pickers themselves.

A picking gang must be well organized, in order to do the best work.

Stained and dirty cotton, when picked, should be put apart at once from the clean cotton; it is always easier to separate it in the field than after it is brought into the house. *A pocket on the picking bag is very useful for this purpose.*

The driver should always be instructed to insist on the pickers extracting all the cotton from the bolls. There is always a great tendency for them to leave a little cotton in the bottom of the bolls.

Too much time can be spent assorting cotton in the house. It is not necessary to pull it all out so as to make it have a fluffy appearance. It is not necessary to whip all the cotton. Whipping should be reserved for dirty cotton only. Dirty and stained cotton and pieces of dry leaves should be carefully removed.

When the cotton has been cleaned and thoroughly dried, it should be bulked from three to six weeks before it is sent on to the ginnery.

Do not mix cottons which are obviously of different qualities.

GRADE IN COTTON: DEFECTS WHICH INFLUENCE IT.

In the very useful little pamphlet, 'Sea Island Cotton: Its Culture, Improvement, and Diseases' (*Farmers' Bulletin 302* of the U.S. Department of Agriculture), the following account is given of the defects which reduce the grade, and consequently the market value of cotton. Fortunately, it will be seen that the careful planter can prevent the occurrence of most of these defects:—

The term 'grade' in cotton indicates the appearance of the lint, as regards cleanliness, and colour—qualities influenced mainly by the manner in which the cotton has been handled. The price is considerably influenced by the grade.

The following are the chief defects that have an influence on the grade:—

Loss of Bloom or Lustre. The best Sea Island staple has a gloss or lustre which adds greatly to its beauty and is indispensable for certain kinds of fabrics. This bloom is destroyed by exposure to sun and storm when cotton is left long unpicked, and the staple has then a gray lifeless appearance, sometime termed 'mildewed' or 'weather beaten.' A similar effect is produced by picking cotton when it is wet with rain or dew, and storing it in piles without first drying it in the sun.

To preserve the staple at its best, pick often—once a week, if possible—and expose the seed-cotton to the sun to dry. This is done by spreading it in a shallow layer on a low roof or arbor, where it is turned frequently until so dry that the seed will crack between the teeth.

Loss of Strength. The loss of lustre is accompanied by a lessened strength, so that a staple ordinarily good fails to make as strong a thread as before—an added reason for better care. Very dry cotton is also not so strong as that which, under proper treatment, has retained its natural moisture.

Nep. Spinners designate as 'nep' small white specks in the baled cotton, which they find very difficult to remove in spinning, and which often go into thread and appear in the completed fabric as white dots. These neps are in reality tangles in the fibres, which, when viewed under a microscope, are seen to be weak and undeveloped. They are due in part to picking cotton before maturity. A boll that is forced open to extract the lint is a source of nep, as the cotton in it does not get the necessary exposure to the sun to dry, straighten, and strengthen the fibre. Other nep originates with weak cotton from diseased bolls or from any other cause that prevents the fibres from attaining full development. Such undeveloped staple comes from the gin full of nep. Poor ginning, however, by weakening and breaking fibres, increases loss from this cause. Pickers should be cautioned against picking unripe bolls. Thorough sunning will in part remedy the trouble, and good culture, by producing healthy plants, will do more.

Broken Leaf, etc. The presence of fragments of leaf, weed seeds, and other foreign matter in the cotton reduces its grade. These are often difficult to avoid, particularly after storms, when bits of the dried square or involucre, are often mingled with the cotton: but pickers should be watched and cautioned against picking dirty cotton. Fortunately, the spinners find it easier to remove this class of impurities than the nep previously mentioned.

Short Fibres. A large part of the waste is due to short fibres which have to be combed out. They originate in part in variations in length of the staple on the seed—a serious fault, to be remedied by seed selection. Short fibres are in other cases due to imperfect ginning, which breaks or crimps the staple and may be avoided by better management.

Weak Fibres. The greater part of the waste is due to the presence in the baled cotton of staple from undeveloped or diseased bolls. The bolls in such cases do not open and the fibres do not expand but remain matted together in a 'hard lock.' All locks that do not open out after drying may be assumed to be worthless on account of weak and undeveloped staple. Pickers should be instructed not to gather hard locks, and in the assorting after picking all remaining ones should be thrown out. Seed-cotton still containing hard locks when it reaches the gin can be improved by setting the stripper bars well back from the roller to allow the locks to fall through. Close ginning is a mistake, for it costs the farmer more through deterioration of his cotton than he gains by the slight increase in weight.

The number of hard locks can be greatly reduced by bringing the cotton to perfect maturity through attention to fertilization and culture, and to the control of diseases.

Lack of Uniformity in the Bale. Separate late from early pickings. Buyers desire to have each bale uniform within itself. If, therefore, a late picking is inferior to an earlier one it should not be ginned and packed with the earlier cotton, as the price of a bale is determined by the poorest cotton found in it after thorough sampling.

Yellow Cotton. Buyers invariably complain when a sample of cotton contains yellow staple, and the grade and price are consequently reduced. Yellow tufts in the ginned cotton come from discoloured locks that should have been left unpicked or been sorted out before ginning. They orginate, as a rule, in bolls attacked by the anthracnose or bacterial boll-rot. Their presence in a bale is an indication of too close ginning.

Sand. A bale of cotton always contains considerable sand which has been blown into the open bolls. This is quite unavoidable, but when cotton has been left unpicked and has blown out on the ground the quantity of dirt is increased.

AGRICULTURAL INDUSTRIES OF GRENADA.

A good deal of information relating to the agricultural industries of Grenada is given in the *Annual Report*, 1906-7, on the colony.

The figures relating to cacao production show a considerable falling off in the yield during the last two years. The cacao crop of 1904 reached 67,225 bags. In 1905, it fell to 64,319 bags, while in 1906, there was a still greater drop, and the produce for the year reached only 54,381 bags. The increased prices, however, which have recently been obtained, should, to a large extent, compensate growers for the diminished yield.

Estimates as to the world's consumption of cacao, too, show that since 1902, the quantity consumed has increased by about 40 per cent. This fact also improves the outlook for a cacao-producing colony.

The growing of nutmegs and other spices is the second agricultural industry of Grenada. The figures showing the exports in this line during the last three years, however, indicate that the industry is in a very flourishing condition. In 1904, the spice exports reached 6,915 cwt., and had a value of £33,767. In 1905, although the quantity of spice exported increased to 8,862 cwt., the value had diminished to £27,992. The spice exports of 1906 were rather less in quantity than in the previous year—8,166 cwt.; and the value was still further reduced—to £24,941.

Cotton and cotton seed are exported from Grenada, being produced in Carriacou, where it is stated cotton has never ceased to be cultivated. It is satisfactory to note that the cotton crop for 1906 was a very good one. In 1905, when unsatisfactory weather largely spoilt the crop, no more than 1,899 cwt. of cotton and 4,849 cwt. of seed, the whole being worth £3,365, were exported: in 1906, the exports had increased to 2,799 cwt. of cotton, and 7,526 cwt. of seed, of the total value of £8,003. The cotton cultivated in Carriacou has, in the past, consisted of the Marie Galante variety; but it is pointed out, that during 1906, a marked increase was apparent in the area devoted to the cultivation of Sea Island cotton, and it is believed that the cultivation of this variety will continue to extend, as the peasants realize its value. The Carriacou land settlement scheme is reported as having shown satisfactory progress during 1906, and the following remarks of the Commissioner of Carriacou, in reference to the condition of the land already settled, is quoted in the report:—

'It is again my pleasing duty to record the marked improvement displayed by many of the allottees in the care and cultivation of their holdings. At no period was this more observable than during the terrible drought which prevailed at Carriacou from December 1905, to June 1906.

'It is also gratifying to mention that the cultivation of Sea Island cotton may now be regarded as assured among peasant cultivators. Hitherto, although desirous of embarking on an industry which, from the satisfactory results obtained by the few pioneers of 1905, and for pecuniary reasons, seemed specially attractive, the Carriacou peasant clung hard (and with good reason) to his catch crop of peas and corn, and was somewhat sceptical as to whether cultivation of Sea Island cotton might not interfere with these, or entail a greater expenditure of care and labour than he was prepared to outlay. The experience of 1906 has, however, convinced the doubting ones that good results are obtained with Sea Island cotton even under local conditions of culture, and further, that in the peculiarly adapted soil of Carriacou, Sea Island cotton is quite as hardy as its Marie Galante confrere.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial deals with the coming Agricultural and Canadian Reciprocity Conferences that will be held at Barbados from January 14 to 21. A list of representatives attending the Conferences, and full programme of the proceedings are given on the following pages.

Interesting exhibits from the West Indies were displayed at the Colonial Fruit Show held in London on November 28 and 29 last (p.4). Pimento growing in Jamaica, and the method of curing the crop, etc. are described on page 5.

Cotton Notes include reports as to market prices of Sea Island cotton, Seasonable Notes, and an article containing useful information as to the chief defects in cotton.

The sugar crop results of 1907 obtained on Diamond Plantation, Demerara, show that seedling canes have yielded 26 per cent. more sugar than the Bourbon cane (p.10). On the same page an article appears giving particulars of a method of selective cane reaping which is described as having given good results in Jamaica. Particulars relating to the sugar industry of the Leeward Islands are given on the following page.

Two new remedies for fleas are described on page 13, where also brief articles appear dealing with the occurrence of scale insects on mahogany trees in Antigua, and the connexion between mosquitos and malarial fever.

Fruit Fly in Bermuda.

The Agricultural Society of Bermuda is at present conducting an interesting campaign against the fruit fly (*Ceratitis capitata,* Wied.), which has increased so greatly and is proving such a pest in the islands, that the most radical means for its destruction appear to be warranted. During the past year, therefore, all fruit of the island, known to be in the slightest way affected, has been rigorously destroyed, in the hope of not leaving a single opportunity for the insect to breed this year. The result of this extreme step will be watched with interest.

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The Red Sorrel or Roselle.

Farmers' Bulletin 307 of the United States Department of Agriculture is devoted to an account of the cultivation and uses of the roselle (*Hibiscus sabdariffa*) or 'red sorrel,' as it is known in the West Indies. This plant belongs to the same order as the cotton plant, and is grown in India for its fibre, which is used in the manufacture of cordage and coarser textile products. In other parts of the tropical world, however, notably in Queensland and in the West Indies, the plant is cultivated for the sake of the fleshy, red calyces, which are made into jam, and from which the well-known 'sorrel drink' is manufactured. Quite a considerable industry, in fact, has been developed in Queensland in the manufacture and export of roselle jam. The peculiar acid flavour of the fruits is due to the presence of malic acid. Results of analysis show that the roselle is very similar to the cranberry in composition. The writer of the bulletin urges the cultivation of the roselle plant in California, Florida, and the tropical islands of the United States, on account of the value of the fruits in making drinks and jelly.

◆

Fisheries of the West Indies.

Dr. Thomas Mortensen, K.D., contributes an interesting and illustrated article to *Atlanten* for July and August 1907, in which he discusses many points connected with the fisheries of the West India Islands

Some time ago Dr. Mortensen carried out some investigations at St. Croix, in the hope that evidence would be forthcoming to indicate the possibility of establishing a sponge fishery or oyster-raising industry in the island. These hopes were not confirmed on further inquiry, but, on the other hand, Dr. Mortensen was satisfied as to the great fishery resources that are available around St. Croix and St. Thomas. He mentions that nearly 300 species of fish are known around those islands, a very large proportion of which are of economic importance as being fit for human food. Details are given in reference to several of the chief varieties, and many other points are also discussed, such as the question of fish poison, turtle, lobster, and sea-egg fisheries, and also the various modes of fishing.

It is hoped to publish a résumé of Dr. Mortensen's article in a coming number of the *West Indian Bulletin.*

Quality of Paris Green.

At the Government Laboratory for the Leeward Islands (Antigua), arrangements have been made whereby users of Paris green may have samples of the material examined, and an opinion given as to general suitability for use as an insecticide. By having a preliminary examination made in this way (for which a fee of five shillings is charged), the use of unsuitable qualities of Paris green should be prevented.

Timbers of Jamaica.

In the *West Indian Bulletin*, (Vol VIII, No. 3), a brief abstract of a paper on the timbers of Jamaica prepared for the last West Indian Agricultural Conference by Mr. W. Harris, F.L.S., Superintendent of Hope Gardens, Jamaica, gives a considerable amount of information in respect to the value, for various purposes, of the different woods to be found in the forests and woodlands of that colony.

The name *Ormosia monosperma*, Urb. the Nickel or Bead tree occurs frequently in the list of woods given in the above-mentioned paper. It has since been ascertained that this tree is really a new species and it has been named *Ormosia jamaicensis*, Urb. The tree *Ormosia monosperma*, has been found in the woods of St. Vincent and Dominica. The wood of *Ormosia jamaicensis*, the Nickel, or Bead tree of Jamaica, is stated to be suitable for general purposes in exposed situations, and for housework and furniture.

Dominica Rubber.

A note has already appeared in the *Agricultural News* (Vol V, p 104) on the valuation of samples of Castilloa rubber prepared by the Curator of the Dominica Botanic Station from trees growing in that island.

Samples of Para and Funtumia, as well as Castilloa rubber were recently forwarded to the Imperial Commissioner by Mr. Jones, for valuation and report. The Para rubber was the first produced in Dominica, but it was stated that the Hevea trees from which it was obtained gave a satisfactory yield.

In reporting upon the samples, Messrs. Hecht, Lewis and Kahn, rubber brokers of London, to whom they were sent, put the value of the Para rubber (which appears to be by far the best) at about 3*s*. 8*d*. per lb. The rubber was sent in the biscuit form, but the brokers point out that slightly excessive thickness of the biscuits prevented the latex drying properly, and consequently lowered the value.

The Castilloa rubber was valued at from 3*s*. to 3*s*. 3*d*. per lb., and the Funtumia at 2*s*. 9*d*. to 3*s*. Slight improvements in preparation would result in somewhat better prices being obtained. A similar report was received from Messrs. S. Figgis & Co, of London, to whom samples were also sent.

While the results so far obtained, indicate that good rubber can certainly be produced in Dominica, the need of further experience in preparation, so as to place the product on the market under the most favourable conditions, is also evident.

Souari or Butter-nut.

Mr. Joseph Jones, the Curator of the Dominica Botanic Station, reports that a fine specimen of the Souari or Butter-nut tree (*Caryocar nuciferum*) fruited recently at the Layou Park estate, Dominica. It is believed that this is the first occasion on which a tree of the species has fruited in the island, although a butter-nut may be seen at the Botanic Gardens, which flowers every year, without having produced any fruit, so far. Other young butter-nut trees, supplied by the Botanic Gardens, are growing in different parts of the island and appear to be doing well.

The native home of *Caryocar nuciferum* is in British Guiana, where it is a well-known tree. It has been introduced into several of the West Indian Islands, and three other species of *Caryocar* are reported from Martinique.

The Souari nut is described as having very valuable qualities, and as likely to be most remunerative in culture. The taste is similar to the almond but sweeter. Small quantities of butter-nuts sent to Europe have, it is reported, found ready sale at good prices.

The butter-nut tree attains a height of 100 feet or more, and the timber is of very excellent quality.

In 1891. butter-nuts were distributed from Kew to the East Indies, Singapore, South and West Africa, etc., with the view of extending the cultivation of this valuable tree.

Vanilla Curing.

A brief article on Vanilla growing in the West Indies, and an approved method of curing the pods, appeared in the *Agricultural News* a few months ago (Vol. VI, p. 299). Fuller details as to satisfactory methods of curing are given in the *Bulletin* of the Jamaica Department of Agriculture (September 1907).

The pods should be gathered only when they are perfectly ripe, and care should be taken in picking to guard against splitting, since this lowers the value.

The pods having been sorted into (1) long, (2) medium, and (3) short lots, each lot is dipped separately in hot water. The water should be at 190°, and the basket of pods should be dipped three times, the first time for ten seconds, then—after an interval of half a minute—for twelve seconds, and, after a second interval, for fifteen seconds.

Sweating is the next process, this being effected by packing the pods in good-sized boxes or barrels. The more pods there are the better the heat is retained. The different lots should be kept separate by a fold of the blanket being placed between them.

The beans are next dried in the sun at a temperature not higher than 110° F. This process takes a few days, and the slower it is the better, and more uniform is the result. The beans should be turned frequently. Drying may be finished in a shed at ordinary temperature.

'Smoothing' follows, and then sorting according to length and quality, and finally tying up and packing, all of which operations must be carried out with care and skill if the best prices are to be realized.

SUGAR INDUSTRY.

Cane B. 147.

The Attorney of a very large estate at Demerara writes as follows in reference to the ratooning properties of B. 147:—

We have just finished crop. The area in 5th ratoons of B. 147 corresponding to that of which I wrote you sometime back, yielded at the rate of 2 tons per acre, although cut at eleven months. I had to cut them so early as I wished to replant with the same variety, but I very much regret ever contemplating the destruction of such a magnificent spring of young canes as has come on. One of the same fields has been kept as ratoons, and from present prospects, should easily give over 2 tons per acre, as 6th ratoons. This is surely sufficient proof of the merit of B. 147.

Results at Diamond Estate for 1907.

The following interesting letter, dated December 8, 1907, from Mr. John M. Fleming, the manager of Diamond Estate, Demerara, containing the results of the crop of 1907 with seedling and other canes, is published in continuation of previous letters which have appeared in the *Agricultural News* (Vol. III, p. 180, and Vol. IV, pp. 3 and 242).

Mr. Fleming writes:—

The results for the Diamond 1907 crop are:—

Seedlings.	Acres.	Tons sugar.	Yield per acre.
Diamond 185	106·009	375	3·53
D. 4,191	4·048	12	2·92
D. 145	894·057	2,573	2·88
B. 208	2,403·174	6,846	2·85
D. 4,415	57·089	150	2·62
D. 109	854·294	2,097	2·45
D. 625	71·157	171	2·30
D. 1,087	9·282	16	1·61
	4404·210	12,240	2·77
Mixed varieties	278·242	748	2·68
Lahania	242·085	647	2·67
Bourbon	1,570·060	3,204	2·04
Total	6,495·297	16,839	2·59

On this occasion, the different seedlings taken together average 26 per cent. better than Bourbon.

Bourbon and D. 109 are both being as rapidly as possible displaced by better varieties, and by the end of 1908 there should be left but little of either variety.

Diamond 185, as you will observe, stands out ahead of other canes, but the area cut is limited, and it cannot be justly compared with B. 208, for instance, of which 2,403 acres were reaped. Next year's figures may modify the relation in which they stand to each other.

The year 1907, so far as weather is concerned, has been peculiarly unfortunate. From January 1 to June 30, 99·74 inches of rain fell at Diamond. Lowered temperature and lack of sunshine prevailed during six months. The soil became sodden, and a surface root growth was induced, which, followed shortly afterwards by a sharp drought of two months' duration, resulted in the development of the cane being checked, and an unusually low tonnage at time of reaping. As some compensation for this state of things, cane juice for the last three months was of remarkably good quality for Demerara.

Selective Cane Reaping At Jamaica.

The following paper, contributed to the *West Indian Bulletin*, Vol. VIII, No. 1, by Mr. A. Charley of Jamaica, discusses a subject likely to be of interest to sugar planters in these islands:—

The method of reaping or cutting canes that is usually adopted throughout the West India Islands involves the cutting of the whole field clean to about the level of the ground. Unripe canes are cut with those that are fully ripe, and all young suckers, many of which are of no value to the factory for sugar manufacture, are cut down to the ground. Canes that are, therefore, ratooned, have to make an entirely new growth, whereas it is possible to save much plant growth in a field of canes when it is cut, by allowing the young suckers to remain untouched by the cutlass. These would continue to grow, or at least, would hold their own throughout the dry season, and furnish a good start for the ratoon crop. An entirely fresh growth of suckers would not have to be depended upon.

The method of selective cane reaping, as started by Mr. T. Campbell and myself in the year 1875, has resulted in the establishment of a system that is generally known as 'picking' canes. This system is largely practised in the parish of Westmoreland, Jamaica, and has given very good results. It is here briefly described in the hope that it may be of value to other growers of sugar-cane, especially in those districts where ratooning is generally practised.

In the system referred to, all full-grown, ripe canes are carefully selected and cut very low down at the roots; especial care being taken not to injure the unripe suckers, as it is by these that the life of the field is sustained during the long dry months of the crop. The full-grown ripe canes that have been cut out are then divided into pieces about 4 feet in length and these portions tied up into bundles. Ten lengths of cane make one bundle, and fourteen bundles are thrown together into a heap. The heaps are made by the cutters in intervals through the field, where carts can gather them up and take them to the mill. The labourer is paid at various rates for cutting the canes and making these heaps. In Westmoreland, 1s. is paid for every twelve heaps, while in Hanover the labourers receive a wage at the rate of 1s. for every fourteen heaps.

The labourers also carry all cane tops to the intervals in which the heaps of cane are made, so that they may be conveniently carted away for use in planting or for fodder for the cattle. No carts are allowed to run on the fields, other than in the intervals, and no cattle permitted to graze or trample over the suckers that are left standing.

It has been found that by adopting this 'picking' of only full-grown, ripe canes, the roots appear to become stronger and to grow deeper in the soil, with the result that the suckers which have been left develop better and give heavier crops of canes than can be obtained from ratoons on fields that have been clean cut. By adopting careful 'picking,' ratoons may profitably be grown for a period of from three to five years, and the expense of planting large areas every year in plant canes is thereby avoided.

By the adoption of such a system, together with a judicious use of artificial manures, it is possible that

Westmoreland planters might obtain very profitable returns from ratoons.

Fields that undergo inundation from river water, and in which this picking is practised, have ratooned well for thirty years. Nasebury piece on Masemure estate, which is subjected to inundation from Canaan River, was planted in 1865. It now yields 1 ton of sugar per acre, and this return is estimated to be more profitable than would be expected from yearly renewal with plant canes, which would result in a yield of about 2 tons of sugar per acre.

On my estate Kew, in Hanover, which is subject to inundations from the Georgia River, there is an area of 150 acres of canes, the date of planting of which cannot be ascertained, since it is not within the remembrance of the oldest inhabitants of the neighbourhood, but it has been found that ratooning after picking has given good results.

As an experiment at the request of one of my overseers, several fields of canes were cut clean, and all canes removed from them by carts, and cattle were allowed to graze over them in a similar manner to that now practised in the Vere district of Jamaica.

The results showed that the fields which were cut clean gave but light crops as ratoons, and it took them fully three years to come up to the standard of the remainder of the estate, where 'picking' or 'selective cane reaping' had been practised, thus showing that the system briefly described above is worthy of careful consideration at the hands of sugar growers.

Sugar Industry in the Leeward Islands.

Interesting particulars as to the condition and progress of the agricultural industries in the Leward Islands are given in the *Annual Report* on the colony for the year 1906-7. The following form the chief notes in relation to the sugar industry:—

Sugar continues to be the chief industry in Antigua and St. Kitt's; in Nevis and Montserrat it is in a decadent condition. This condition has just lately been accentuated in Nevis by the fact that one of the principal estates has ceased to make sugar, and another —the largest in the island —has discontinued planting this crop, and will cease to make it as soon as the crops now planted yield no more canes. It has been suggested that a central sugar factory would restore the industry, but it is difficult to obtain the necessary capital of some £50,000 to £60,000.

St. Kitt's produced an average crop during the past season. Much benefit has resulted to this island from the introduction of new varieties of sugar-cane, such as B. 147 and B. 208, whereby larger crops and freedom from disease have resulted.

The crop of Antigua was again small on account of the continuance of drought. The central sugar factory at Gunthorpe's continued its operations successfully, making 2,348 tons of sugar. Some additions to plant and a small extension of railway were made and paid for out of the year's working expenses, thus in some measure reducing apparent profits. Towards the end of the year a considerable extension of railway was made and additional plant added to the factory, including a Krajewski crusher to be used in the crop of 1907. This is now in operation and doing excellent work. The operations of the factory were extended by three additional estates entering into contracts to supply canes from 1907 onwards.

Bendal's factory was improved by the addition of Babcock and Wilcox water tube boilers. The operations are greatly facilitated by the existence of its tramway, which now extends over about 3 miles. The factory was very successfully operated, the output for the season being 1,178 tons.

Both these factories are under contract with the Government to purchase such peasants' canes as may be offered during a term of years, Gunthorpe's to the extent of 4,500 tons, and Bendal's 1,500 tons a year. There were actually purchased 1,811 tons at Gunthorpe's and 4,728 tons at Bendal's. This has given great impetus to the cultivation of canes by peasants, and very much larger quantities are forthcoming in the crop of 1907.

Improvements have been made in three muscovado sugar works whereby the whole of the boiling is conducted by steam instead of open fires, thus affording better control of the process of sugar making. At the same time improvements have been made in the furnaces, enabling them to burn the megass direct from the mill without subjecting it to a preliminary drying. This makes the work independent of weather conditions, besides effecting many other economies.

Exports of Sugar Products From the United States.

The details given below as to the exports of sugar, molasses, etc, from the United States to Great Britain and other countries, are worthy of note by producers in the West Indies. They are taken from the *American Sugar Industry* of November 5:—

The fact that the United States has a considerable export trade in refined sugar, syrup, molasses, etc., is not often mentioned in consular reports, or emphasized in commercial statistics.

The bulk of the exports of molasses go to Canada and the United Kingdom. Although the Dominion has taken smaller quantities each year for several years, Great Britain has increased its purchases in much greater ratio, so that the total exports of molasses from the United States has increased from 3,819,139 gallons in 1904, to 10,205,885 gallons in 1906

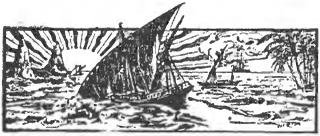
Refined sugar is exported to Bermuda and to all the British colonies, as well as to Hayti, Japan, Russia, Mexico, and many other countries. The greatest increase in exports in the past three years has been to Mexico, which has increased its purchases of American sugar from 663,842 lb. in 1904, to 5,178,159 lb. in 1906. Newfoundland and Labrador stand second on the list, exports to those colonies having increased from 1,174,760 lb. in 1904 to 4,455,881 lb. in 1906. The total exports of refined sugars have mounted from 15,304,560 lb. in 1904, to 21,899,290 lb. in 1906.

The value of all the United States exports of sugar products has increased from $2,970,894 in 1904, to $3,783,971 in 1906.

ANTIGUA'S TRADE WITH CANADA.

The *Maritime Merchant* of November 14 last, reported an interview which a representative of that paper had with an Antiguan merchant, then on a visit to Canada. Referring to trade between Antigua and the Dominion, this gentleman stated:—

A large part of our entire business in Antigua is done with Canada, for the Dominion buys most of our sugar and molasses, and sells us our fish, lumber, oats, split peas, and some of our flour. The trade in the last article is increasing since we began importing the flour of the Ogilvie Flour Mills at Montreal. This flour seems to keep quite as well as that produced in the United States, and makes good, strong bread.



GLEANINGS.

The owners of pigs and other animals found straying on the public roads in Dominica are liable to a penalty of £5 (*Official Gazette*).

The cacao crop is being rapidly gathered in some parts of Trinidad. The *Port-of-Spain Gazette* reports that no less than 3,030 bags were brought to town on one day from the Arima district.

Much has of late been heard of the scarcity of labour in Cuba, but a recent issue of the *Havana Post* reported that no less than 2,535 immigrants, chiefly from Spain, were shortly expected in the island.

The presence of the American fleet in Trinidad waters has been an excellent thing for the fruit trade of the island. One firm received an order for 80,000 oranges. (*Trinidad Mirror.*)

Balata to the extent of 823,940 ℔. was exported from British Guiana from January 1 to October 31 of the past year, as compared with 543,651 ℔. exported during the corresponding period of 1906.

The world's egg-laying record for twelve months is held by Mr. W. Williams of Clarendon, Australia, whose six birds have laid a total of 1,494 eggs during that period. The net profit per bird represented by the above production is about $2·25.

Mr. Joseph Connell of Barbados has devised a process for the utilization of cotton stalks, and other West Indian vegetable fibres suitable for the manufacture of paper pulp, etc. He has applied for a patent in the island. (*Official Gazette.*)

The *Annual Report* on the Leeward Islands states that 725 acres of Dominica crown lands were, during 1906-7, sold to small peasants and 983 acres to new settlers. The price of crown lands in Dominica is at 10*s.* an acre.

The pine-apple industry of Antigua is referred to in the latest *Annual Report* on the Leeward Islands as being practically extinct, as the result of ravages of disease, absence of shipping facilities, and the greater attractions of cotton cultivation.

Official returns relating to the trade of Trinidad show that the imports of flour from Canada, during the quarter ending September 29 last, exceeded by 500 barrels, the imports made during the corresponding period of 1906.

The U. S. Consul at Rio de Janeiro states in his report that the final official figures of the Brazilian coffee crop of the year ending June 30 last, place the yield at 20,409,180 bags, an increase of 84·6 per cent. over the crop of the previous year.

The report for 1906 of the Department of Agriculture in French Indo-China mentions the satisfactory growth of planted *Ficus elastica* trees, which at six years old measure from 26 to 29½ feet in height. Twenty such trees yielded, from experimental tapping, 22½ ℔. of rubber, an average of about 1⅛ ℔. per tree.

Molasses, when fed in small quantities to ducks and poultry, is stated by a well-known poultry farmer in New South Wales, favourably to influence the egg-producing capacity of the birds. From a pint to a quart daily was the quantity given to 300 birds.

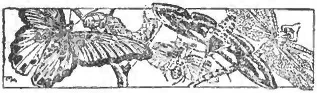
An interesting exhibit at the London Dairy Show of October last, was a quick-working butter churn shown by Messrs. Robert Boby, Ltd., of Bury St. Edmunds. Butter of good quality was produced at the end of two minutes after churning had commenced, and a silver medal (the highest award offered in the class) was adjudged to the exhibitor. This churn, known as 'Garbutt's two-minute' churn, appears to be made in several sizes, at prices ranging to £10.

The U. S. Consul at Cartagena estimates the exports of tobacco from Colombia for the present season as 120,000 bales of 138 ℔. each. The Consul remarks that there is a good deal of land suitable for tobacco production in certain districts of Colombia, and that if tobacco were carefully grown and treated, it is believed that it would rival that grown in Cuba and Porto Rica.

About 750,000 acres of land in Formosa are planted with rice, this constituting about 40 per cent of the total cultivated area. The average annual yield of this area is 20,000,000 bushels of rice, or barely 27 bushels per acre. About half the 750,000 acres is supplied with irrigation water. (*U. S. Consular Reports.*)

In reply to a letter from the Imperial Commissioner, Mr John Barclay, Secretary of the Jamaica Agricultural Society, writes to say that no sweet potato flour or starch is prepared in Jamaica, but that all the sweet potatos grown are consumed in the island or exported to Colon. The preparation of flour or starch from sweet potatos does not appear to be undertaken in any of the West Indian Islands.

The extraction and manufacture of wax from the berries of *Myrica cordifolia* is reported as having become quite an industry in Cape Colony. The shrub in question has been largely planted in the colony for the purpose of binding drift sands. The wax from the berries is similar in character to the myrtle wax derived from *Myrica cerifera*, and will probably be found useful in soap making and also in the manufacture of candles. A nearly allied plant to *Myrica cordifolia*, is *M. coriacea*, which is found in the West Indies, and which also yields a wax. (*U.S. Consular Report*, November 1907.)



INSECT NOTES.

Scale Insects on Mahogany trees in Antigua.

Mr. J. Jackson, Curator of the Botanic Station, Antigua, sends the following note with reference to an attack of scale insects on mahogany trees in Antigua:—

> A number of young mahogany trees (*Swietenia Mahogoni*), planted in and around St. John's, are at the present time attacked by the following scale insects: The Brown Shield Scale (*Lecanium hemisphaericum*), the Hibiscus Shield Scale (*Lecanium nigrum*), and the Orange Snow Scale (*Chionaspis citri*).
>
> Of these, *Lecanium hemisphaericum* is perhaps the most difficult to deal with, as several sprayings of rosin wash are required before all the insects are killed.
>
> *L. nigrum* can also be controlled by the use of rosin wash.
>
> Applications of whale-oil soap will control the attacks of *Chionaspis citri*.
>
> The above three insects are fairly common in Antigua. They are figured, with others, in Pamphlets Nos. 7 and 22 of the Imperial Department of Agriculture—'Scale Insects of the Lesser Antilles', although the mahogany tree is not mentioned in those pamphlets as a host plant for the pests.

Two Flea Remedies.

Fleas are the cause of so much personal annoyance, and their part in the conveyance of bubonic plague is now so well known, that every new means of getting rid of this insect pest will be welcomed. Dr. L. O. Howard, Chief of the Bureau of Entomology of the U. S. Department of Agriculture, writes to *Science* of November 29 last, to describe the following two remedies, which he states are vouched for by careful persons, although he himself has had no good opportunity of testing either.

Dr. Howard writes:—

> Mr. E. M. Ehrhorn, the well-known Entomologist who is Deputy Commissioner of horticulture in California, gives me the following: 'Fill a soup plate with soap suds; in the centre place a glass of water with a scum of kerosene on top; place the soup plate on the floor in an infested room, and set fire to the kerosene at night. Fleas in the room will be attracted and will jump into the soap suds.'
>
> Another remedy is sent me by the well-known writer on ants, Miss Adele M. Fielde, with the request that I will make it widely known. Miss Fielde states that during long residence in Southern China, where fleas swarm even in clean houses, she made her own house immune through many years, by dissolving alum in the white wash or kalsomine that covered the interior walls, putting sheets of thick paper that had been dipped in the solution of alum, underneath the floor matting, and scattering pulverized alum in all crevices where insects might lodge or breed. Powdered alum, she states, may be sprinkled upon carpets already laid, and then brushed or swept into their meshes with no injury to the carpets and with certainty of banishment to many insect pests, including both moths and fleas.

Dr. Howard quotes the following extract from Miss Fielde's letter:—

> Sheets that have been soaked in alum water and then dried may profitably enclose those that are spread nearest to the sleeper . . . . From 10 to 20c. worth of alum judiciously used in each room of the house will effect much good in the prevention of dangerous insects.

Mosquitos and Malarial Fever.

Only a comparatively short time has elapsed since the so-called mosquito theory of disease was first brought forward, and even now many persons affect to believe that there is no connexion between mosquitos and the diseases which they are said to carry.

That this relation exists has been abundantly proved, and it is of interest to note that centuries ago the medical men of India recognized such a relation between mosquitos and at least one disease, i. e., malarial fever.

The following notes dealing with this point appeared in the *Tropical Agriculturist* for May 15, 1905 (p. 712), and were taken from a paper read by his Excellency the Governor, Sir. Henry Blake, before a meeting of the Ceylon branch of the British Medical Association:—

> In the course of inquiries into the cause of an epidemic of malarial fever in Colombo last year, I received a report from the Sinhalese Medical Association, in which it was mentioned incidentally, that according to the ancient Hindoo authorities on medicine, the chief causes of the disease are impure air, and water, and the existence of mosquitos. I requested more precise information showing that mosquitos were associated with the causation of malarial fever, and in reply, I received extracts from ancient Indian works. One of these works, compiled from one of the lost Vedas or Hindoo Scriptures, must be at least 1,400 years old, since it is mentioned in writings of the sixth century. The extracts in question referred to twelve kinds of mosquitos as causing life-destroying diseases: 'their bite', it is said, 'is most painful, and causes disease, accompanied by fever, pain of limbs, vomiting, diarrhœa, thirst, giddiness, shivering, burning sensation, etc.'

Other mosquitos are also referred to, whose bite causes inconvenience such as swelling, itching, etc. Sir Henry Blake states that in order to satisfy himself on the point he invited five Sanscrit scholars of acknowleged authority, to meet at Queen's House to discuss the subject. These gentlemen testified to the correct translation and authenticity of the extracts. These passages, therefore, says the *Tropical Agriculturist*, written possibly 3,000 years ago, and certainly not less than 1,400 years ago, are of singular interest, foreshadowing as they do the great discoveries of Manson and Ross.

The twenty-sixth annual sale of live stock from the Government farm, Trinidad, will take place at Valsayn, St. Joseph, on Wednesday, February 12 next. A large number of high-class animals are to be disposed of, including eighty-four head of pure and cross bred cattle, a few mules, pigs of the Berkshire, Poland-China, Duroc-Jersey, and other breeds, and also poultry, ducks, and pigeons.

LIME CROPS AND PRODUCTS.

The information given herewith, is published in continuation of the article on Lime Cultivation that appeared in the last issue of the *Agricultural News*, and forms a summary of the second part of the pamphlet on Lime Growing and Preparation that will shortly be issued by the Department. Further details with regard to the preparation of lime juice and citrate of lime will appear in a subsequent article:—

The main flowering period of the lime is from February to June, and the crop season from June to December. Accurate observation on the length of time from the date of flowering to maturity of the lime fruit, does not appear to have been made, but it is usually placed at five months, and depends chiefly on the local weather conditions and on the region of the trees. The yield of limes per acre varies greatly, but good estate cultivation should produce from 150 to 200 barrels annually, while much land does not give more than 80 to 100 barrels of fruit. A barrel of limes gives from 7½ to 8 gallons of juice, but the acidity varies according to the rainfall. An estate with a low rainfall may average 14 oz. of citric acid per gallon of juice, while another in a very wet district in the hills may give no more than 10 oz. per gallon.

Eight-ninths of the lime products produced in Dominica is concentrated for sale to the citric acid makers, while the remaining one-ninth is exported as raw lime juice for making cordial. The establishment of a citrate factory in Dominica will probably tend to reduce somewhat the manufacture of concentrated juice, for this factory takes the juice after the essential oil has been expressed, and before concentration is in the usual course begun. The standard on which concentrated lime juice is usually sold is a pipe of 108 gallons testing 64 oz. to the gallon; but in the West Indies, a 52-gallon hogshead testing 133 oz. to the gallon forms the standard.

MACHINERY REQUIRED, ETC.

Many of the old three-roller sugar mills are still in use for crushing limes. These are usually driven by water power and in some instances by cattle. On small estates, mills worked by hand-power are in use. The sugar mill with iron rollers adjusted to crush limes has answered admirably where the lime juice is concentrated. The machinery required for dealing with lime juice consists of a three-roller mill driven by steam, water, or cattle, (iron rollers may be used where the juice is to be concentrated, but they should be of granite where raw juice is prepared for shipment for making cordial); a press for extracting any juice left in the skins after passing through the mill, strong vats, a copper still, three copper tayches in which to boil the juice, and coolers.

The Dominica Planters' Association has furnished the following detailed estimate as to the cost of mill, mill house, two tayches, battery and boiling house, suitable for a beginner in lime cultivation:

1 Copper tayche	(50 gallons)	£25
1 ,, ,,	(80 gallons)	£35
Hand mill		£30
Vats		£10
Still	(80 gallons)	£80
Buildings		£125
	Total	£305

Later, as the crop increases, the works would need enlargement, and a copper still, and three tayches of a larger size, would also be required.

The works should be arranged so that the well house is no higher ground than the boiling house, in order that the juice may run by gravitation from the well to the storage vats, from the vats to the still, from the still to the copper tayches where it is concentrated, thence to the wooden or copper coolers, and finally into hogsheads for shipment.

GREEN LIMES.

A considerable business in green limes with New York and London has been developed in Dominica, the export of fruit during 1906 being 15,799 barrels, valued at £5,530, as against the early shipment of 99 barrels in 1891.

The American market demands a small fruit packed in well ventilated barrels, and the London market a large fruit packed in small crates of a capacity of 1 cubic foot. A barrel holds from 1,400 to 1,600 fruits, and a crate from 200 to 240.

Green limes are picked from the trees and are allowed to 'quail' for some days before being carefully packed. Each fruit is wrapped in paper, and is carefully packed in barrels or crates. Very great care is required in gathering, handling, wrapping, and packing.

PICKLED LIMES.

In Dominica a small business is done in shipping limes pickled in sea water, but during late years the export has fallen off somewhat. The average export of pickled limes from Dominica for the five-year period ending 1896, was 1,505 casks, and for the five years ending 1906, 1,000 casks. A cask holds about 2,000 limes, and they are chiefly exported to Boston.

For pickling, the finest specimens of sound yellow limes are selected and placed in vats into which sea water is pumped. In two or three days, the water is run off, and fresh sea water is pumped in. This process is repeated several times until the limes are cured and the fruits are placed in casks filled with sea water to which a small amount of salt is added. The casks are then closed and are ready for export.

HAND-PRESSED LIME OIL.

This is obtained by hand-pressing the limes over an ecuelle pan. The ecuelle is a shallow, concave, circular copper pan studded with blunt spikes with a receptacle at the base to catch the oil. The work of obtaining hand-pressed oil is done by women, who select the best limes and pass them quickly with a circular movement, over the blunt spikes, exerting sufficient pressure to break the oil cells in the skins of the limes. The oil runs into a receptacle and is collected from time to time in bottles. It is then settled and afterwards passed through filter paper and run into copper vessels for export.

A barrel of limes should give from 3 to 4½ oz. of oil by this process, and the usual price paid for extracting it is 1*d.* per dozen fruits.

The yield of oil varies according to the conditions of moisture. In localities where the annual rainfall is from 60 to 100 inches, the citric acid content of the juice of the fruit is high, and the yield of oil from the rind of the fruit low, but where the rainfall is high—say from 130 to 200 inches—the citric acid content is low and the yield of oil high.

DISTILLED LIME OIL.

Before lime juice is run into tayches for concentration, it is distilled for the oil, and in the case of estates that ship raw juice, the scum that collects on the juice in the settling vats is alone distilled.

The yield of oil by distillation is from 3 to 5 oz. per barrel of limes, or, taking 30 barrels of fruit to make 1 hogshead of concentrated juice, from 15 to 25 lb. per hogshead.

The oil is exported in either copper or tin vessels packed in boxes, and commands a lower price than hand-pressed oil. It is used in perfumery and for soap making.

ARBOR DAY IN ANTIGUA.

The Hon. Francis Watts, D.Sc., C.M.G., has forwarded a report from which it appears that Arbor Day was observed in Antigua in the usual manner on November 9 last.

In St. John's parish various institutions took part in the ceremony, more especially the elementary schools. Dr. Watt's delivered a brief address on the history and objects of the Arbor Day movement in Antigua, to a gathering in the Victoria Park, at the conclusion of which his Excellency the Governor planted a walnut tree near the band-stand. The Governor also made a short speech

The elementary schools of the parish planted twenty mahogany trees in the Elementary School Avenue, leading to the Camp and Hospital, while the Hospital Staff also planted sixteen mahogany trees on the road to the Hospital from North Sound Road. Ten Jamaica shade trees (*Pithecolobium Saman*) were also planted in the Hospital grounds.

It may be mentioned, too, that sixteen date palms were planted by the Revd. C. E. Romig at Potters Village.

Similar activity was evident in other parishes, notably in All Saints,' where, previous to the planting of fourteen trees, the National Anthem was sung and an address delivered by the Vicar.

Several estate owners observed Arbor Day by planting trees on their own estates, e.g., Mr. Edghill of Vernons' estate in St. Peters, Mr. Dyett of Fitches Creek in St. George's, and Miss Johnstone at Cades Bay in St. Mary's.

Altogether 241 trees were planted in Antigua on this occasion, the chief kinds being mahogany, cabbage palms, eucalyptus, mango, Jamaica shade trees, and date palms.

Dr. Francis Watts was Chairman of the Central Committee appointed to organize the celebrations.

JIPPI-JAPPA HAT INDUSTRY IN JAMAICA.

Several references have already been made in the *Agricultural News* (Vol. IV, p. 313, Vol. V, p. 233) to the manufacture of jippi-jappa hats in Jamaica, an industry which, if properly developed, would afford employment to large numbers of women and children, since a considerable and increasing demand exists for the hats, which form a good and cheap substitute for the more expensive 'Panama.'

An article on this subject occurs in the October number of the *Journal of the Jamaica Agricultural Society*, where it is stated that practical steps have lately been taken to promote the industry, and to spread a knowledge of the best methods of manufacture. With this idea several of the Branch Agricultural Societies have held classes, where girls have been trained in hat plaiting by an instructress. Messrs. Kerr & Co. started a hat factory at Montego Bay, which, unfortunately, does not appear to have succeeded very well. Better results, however, have followed the institution of a factory at Kingston.

It is stated that there is always a demand for these hats by merchants for export abroad, and at such a price as will pay people to make them, provided good material is used, and the hats are well made.

The jippi-jappa plant (*Carludovica jamaicensis*), known sometimes as the 'Broom Thatch', is closely related to the Panama hat plant (*C. palmata*). It does not belong to the palm family, although it is very palm-like in appearance.

The plant is stated to be one that would grow freely in the warm, humid districts of Jamaica, but up to the present it appears to have been restricted to a limited district of the island, along the watersheds of the Pedro River and Wag Water. It grows well among rocks, and where there is plenty of rain, and does especially well along the banks of little streams, where it might with advantage be planted out so as to ensure a good supply of the raw material.

IXORA MACROTHYRSA.

Mr. J. Jackson, Curator of the Botanic Station, Antigua, writing to mention the fact that a specimen of *Ixora macrothyrsa*, introduced during the year 1904-5, recently flowered for the first time at the Botanic Station, gives the following particulars with reference to the plant:—

Ixora macrothyrsa belongs to the natural order Rubiaceae, an order in which many economic, and some valuable decorative plants are included.

The Ixoras are natives of the East. They are found in India, China, Malaya, etc., the habitat of *I. macrothyrsa* being Sumatra.

In Antigua, I have seen *Ixora coccinea*, which is found in many gardens, and *I. macrothyrsa*, of which there is but one small plant in the Botanic Station.

The flowers of *I. macrothyrsa* are borne in handsome terminal corymbs, the colour being a deep red, becoming tinged with crimson as the flower gets older. The leaves of this plant are of a deep green, and attain a length of from 8 to 10 inches. It is a flowering shrub which is worthy of cultivation

Ixoras can be propagated by inserting short jointed cuttings in sandy soil. They quickly root if kept shaded for a time.

RUBBER IN ANGOLA.

Some interesting particulars with regard to rubber production in the Portuguese colony of Angola (S. W. Africa) are given in a recent British *Consular Report*.

At present the great bulk of the rubber produced in the colony is root rubber, and is obtained from the rhizomes of two plants, *Carpodinus chylorhiza* and *Carpodinus gracilis*, the former of these being much the more important. Both of these grow wild in sandy soil, and the former is reported as being distributed over vast inland areas, extending both northward and eastward. The collection and preparation of this root rubber is carried on almost solely by the natives. The quality of the produce, after removal of extraneous matter, is stated to be very good.

Europeans are now, however, taking up the rubber industry, the Ceara variety (*Manihot Glaziovii*) being the one chiefly cultivated and giving the best results. The average yield of rubber per tree per annum is 2 lb., and this, it is stated, commands a price of 5*s.* 6*d.* per lb. The trees begin to yield rubber when about five years old.

Landolphia rubber vines also occur largely in Angola, but these are reported to take twenty years to mature. Experimental cultivation is about to be made with Para rubber (*Hevea brasiliensis*) and Lagos rubber (*Funtumia elastica*), but for this purpose plants will have to be imported. Endeavours are being made to introduce systematic cultivation and to create a valuable industry, and the services of an expert botanist from Kew Gardens have been secured, who has been making extensive researches as to the rubber resources of the colony, and will shortly issue a report.

MARKET REPORTS.

London,—December 23, 1907, 'The West India Committee Circular;' Messrs. Kearton, Piper & Co.; December 13, Messrs. E. A. de Pass & Co.; 'The Liverpool Cotton Association Weekly Circular,' December 20, 1907.

Arrowroot—St. Vincent, 2½*d.* per lb.

Balata—Sheet, 2/1 to 2/4; block, 1/7 per lb.

Bees'-wax—£7 15*s.* per cwt.

Cacao—Trinidad, 114/- per cwt.; Grenada, 92/- to 99/- per cwt.

Coffee—Santos, 29/4½ per cwt.

Copra—West Indian, £21 per ton.

Cotton—18*d.* to 20*d.* per lb.

Fruit—

- Bananas—Jamaica, 4/6 to 5/- per bunch.
- Limes—No quotation per box.
- Pine-apples—St Michael, 1/- to 2/3 each.
- Grape Fruit—4/- to 6/- per box.
- Oranges—Jamaica, 3/6 to 5/6 per box.

Fustic—£4 5*s.* to £4 15*s.* per ton.

Honey—22*s.* to 22*s.* 6*d.* per cwt.

Isinglass—West India lump, 1/4 to 2/4 per lb.; cake, no quotations.

Lime Juice—Raw, 1/1 to 1/5 per gallon: concentrated, £18 5*s.* per cask of 108 gallons; Distilled Oil, 1/9 to 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.

Logwood—£4 5*s.* to £4 15*s.* per ten; Roots, £3 5*s.* to £4 5*s.* per ton.

Mace—Fair, 1*s.* to 1*s.* 3*d.*; pale, 1*s.* 4*d.*; broken, 10*d.* to 1*s.*; ordinary, 1*s.* to 1*s.* 1*d.* per lb.

Nutmegs—75's, 8*d.*; 77's, 6*d.*; 92's to 103's, 5½*d.* to 6½*d.*; 112's to 134's, 4½*d.*

Pimento—Market quiet, 3*d.* to 3¼*d.* per lb.

Rubber—Fine hard Para, 4*s.* 3½*d.* to 4*s.* 4½*d.*; fine soft, 4*s.* 2½*d.* to 4*s.* 3½*d.* per lb.

Rum—Jamaica, common, 2*s.* 9*d.* to 2*s.* 11*d.*; good, no quotations; fine, no quotations; Demerara, 1*s.* 1½*d.* to 1*s.* 3*d.*; Trinidad fair, 1*s.* 1*d.* per proof gallon.

Sugar—Crystals, 16/6 to 19/6 per cwt.; Muscovado, 9/4½; Molasses, 11/9 to 14/9.

New York,—December 13, 1907.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 21c. to 23c.; Grenada, 21c. to 22c.; Trinidad, 22c. to 22½c.; Jamaica, 18c. to 20½c. per lb.

Cocoa-nuts—Jamaica, select, $25·00 to $28·00; culls, $12·00: Trinidad, $18·00 to $19·00; culls, $12·00.

Coffee—Jamaica, fair ordinary, 6½c. to 8c.; good washed, 9½c. to 10½c.; per lb.

Ginger—Small to scraggy root, 13c. to 13½c. per lb; small to bright bold, 13¾c. to 14½c. per lb.

Goat Skins—Jamaica, 45c.; Barbados, Antigua, and other West India, 43c. to 52c.

Grape Fruit—Jamaicas, no quotations per barrel, $1·00 per box.

Limes—No quotations.

Mace—27c. to 31c. per lb. according to colour and quality.

Nutmegs—110's, 9½c. to 9¾c. per lb.

Oranges—Jamaica, no quotations per barrel, no quotations per box.

Pimento—6c. per lb.

Sugar—Centrifugals, 96°, to $3·85; Muscovados, 89°, 3·35c.; Molasses, 89°, $3·10 per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., January 7, 1907; Messrs. T. S. Garraway & Co., January 6, 1907; Messrs. Leacock & Co., January 7, 1907.

Arrowroot—St. Vincent, $4·15 to $4·50 per 100 lb.

Cacao—Dominica, $16·00 to $17·00 per 100 lb.

Cocoa-nuts—$11·35 per M. for husked nuts.

Coffee—Jamaica, $8·25 to $10·50 per 100 lb.

Hay—$1·85 to $1·90 per 100 lb.

Manures—Nitrate of soda, $62·60 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.

Onions—Madeira, $1·50 to $2·50 per 100 lb.

Potatos, English—$1·50 to $2·10 per 160 lb.

Peas—Split, $6·00 to $6·50; Canada, $3·50 to $3·85 per bag.

Rice—Demerara, $4·25 to $5·45 (177 to 180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.

Sugar—No quotations.

British Guiana.—December 28, 1907.—Messrs. Wieting & Richter; Messrs. Sandbach, Parker & Co.

Arrowroot—St. Vincent, $10·50 per barrel.

Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.

Cacao—Native, 20c. to 21c. per lb.

Cassava—No stock.

Cassava Starch—$9·00 per barrel.

Cocoa-nuts—$12·00 to $16·00 per M.

Coffee—Creole, 13c.; Jamaica, 12c. per lb.

Dhal—$4·75 to $4·80 per bag of 168 lb.

Eddos—$2·16 to $2·40 per barrel.

Molasses—Yellow, 18½c.; Dark, no quotations per gallon.

Onions—Madeira, 3c.; Lisbon, 2½c. per lb.

Plantains—20c. to 60c. per bunch.

Potatos,—Madeira, $3·00 to $3·25 per barrel.

Potatos, Sweet—Barbados, $1·20 per bag.

Rice—Ballam, $6·25 to $6·40; Creole, $4·50 to $4·85 per bag; Seeta, $6·00 per bag.

Rubber—3/4 to 3/10 per lb.

Split Peas—$4·00 to $7·75 per bag (210 lb.).

Tannias—$3·36 per bag.

Yams—White, $3·50; Buck, $3·84 per bag.

Sugar—Dark crystals, $2·20 to $2·25; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).

Timber—Greenheart, 32c. to 55c. per cubic foot.

Wallaba Shingles—$3·50 to $5·50 per M.

——Firewood—$2·40 to $2·64 per ton (3-feet lengths).

Trinidad,—December 28, 1907.—Messrs. Gordon, Grant & Co.

Cacao—$18·50 to $19·50 per fanega; Venezuelan, $20·00 per fanega.

Cocoa-nuts—No quotation.

Cocoa-nut Oil—70c. per Imperial gallon.

Coffee—Venezuelan, 7c. to 7½c. per lb.

Copra—$2·75 to $3·00 per 100 lb.

Dhal—$4·25 to $4·40 per 2-bushel bag.

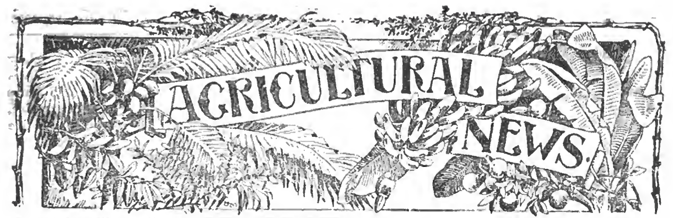
Onions—$2·25 to $2·50 per 100 lb. (retail).

Potatos, English—$1·60 to $1·75 per 100 lb.

Rice—Yellow, $5·50 to $5·60; White, $5·50 to $6·00 per bag.

Split Peas—$6·00 to $6·10 per bag.

Sugar—$5·00 to $5·10 per 100 lb.



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West Indian Agricultural Conference, 1908.

THE seventh West Indian Agricultural Conference was opened at the Mutual Life Assurance Buildings, Barbados, on Tuesday, January 14. His Excellency Sir Gilbert Carter, K.C.M.G., was present, and extended a hearty welcome to the delegates on behalf of the colony.

Sir Daniel Morris then delivered his presidential address, in which he reviewed, at considerable length, the position and prospects of the several agricultural industries of the West Indies and British Guiana.

The sugar industry received first attention. Discussing the question of exports, Sir Daniel pointed out that the chief concern at the present moment was in finding a reliable market for West Indian cane products. He referred to the favourable market for sugar and molasses offered by Canada, which imported direct from the West Indian colonies 79 per cent. of the total sugar consumed in the Dominion during the year ended June 30 last.

The increasingly valuable results that have followed upon experiments in raising seedling canes were dwelt upon. These canes not only yield a larger percentage of sugar, but are also more disease resisting. It is satisfactory to note that planters are recognizing the value of the best of these canes, and that year by year a larger area is planted with them. This is especially noticeable in British Guiana, where over 30,000 acres are now planted with seedling canes. Reference was made to the fact that on one estate in Demerara with 4,404 acres under seedling canes, and 1,570 acres under Bourbon canes, the seedling canes taken together averaged 26 per cent. better than the Bourbon for the crop of 1907. Amongst the seedling varieties, 2,403 acres were under B. 208, and this variety during the crop of 1907 yielded 40 per cent. more sugar than the Bourbon cane.

In a paper read by Mr. Bovell at the Jamaica Conference (*West Indian Bulletin*, Vol. VIII, p. 78), it was stated that more profit was derived from the cultivation of the Barbados seedling canes on the above estate during the years 1903-6 than would cover the cost of the sugar-cane experiments at Barbados since they were inaugurated in 1884.

Referring to the situation in regard to seedling canes in the Leeward Islands, Dr. Watts makes the following noteworthy statement: 'If we take the exports of sugar from Antigua and St. Kitt's at approximately 25,000 tons, worth £200,000, and assume that the industry has benefited to the extent of only 10 per cent. by the introduction of disease-resisting seedlings, this would give the very rough approximation of £20,000 a year as a value of the introduction of new varieties of canes, a sum in excess of that spent in maintaining the Imperial Department of Agriculture in its entirety.'

Following this, the Imperial Commissioner passed on to a review of the West Indian cacao industry, which comes second in importance to that of sugar, the cacao exports from these colonies for the year 1905-6 being valued at about £1,500,000.

Cacao is of primary importance in Grenada, where it forms practically the sole crop, as well as in Trinidad, where it is worth double the value of sugar. During the past five years the average value of the cacao exports from Grenada reached £236,351; from Trinidad, the average annual value of the cacao shipments during the same period was £907,083. The exports of cacao from Jamaica of late years have shown a steady increase, as the result of efforts made by the Botanical Department and agricultural instructors in pushing the cultivation. In 1905-6, the shipments were 32,587 cwt., having a value of £105,907; in the following year (1906-7) this had advanced to 50,057 cwt., having a value of £190,216. Cacao cultivation is also being extended at St. Lucia and Dominica.

Sir Daniel referred briefly to the manurial experiments with cacao conducted by the Department at Grenada, St. Lucia, and Dominica, the experiment plots in some cases being adopted as centres at which lectures and demonstrations are given to small cultivators in remote districts. This is especially the case in Grenada, in which island also experiments on a larger scale are being conducted on several estates with the help of the Agricultural Department.

The Imperial Commissioner next gave some particulars with regard to the West Indian fruit industry and pointed out that the demand for fresh tropical fruits in the European markets would justify greater attention being paid to the production of bananas, citrus fruits, etc. The value of the fruit exports from Jamaica in 1906-7 amounted to £964,781. The only other colony from which fruit is shipped in an appreciable quantity is Trinidad. The value of the exports in 1906-7 was £4,682. If suitable shipping facilities were available, Barbados possesses excellent prospects of a valuable banana industry.

The remarkable extension of Sea Island cotton cultivation in the West Indies during the past few years, and the present prospects of that industry came next for review. For the year 1908, there are 24,000 acres of cotton under cultivation in these colonies, as compared with 4,000 acres in 1903, 11,238 acres in 1905, and 18,166 acres in 1906. Assuming the average yield of lint at 150 lb. per acre, with an average value of 1*s*. 4*d*. per lb., Sir Daniel Morris pointed out that the value of the lint and seed from the 20,000 acres now under Sea Island cotton cultivation will not improbably reach a value of £250,000. Also that in another five years it would be safe to assume that the total annual value of the cotton industry in the West Indies will be a half a million sterling. Although in islands like St. Vincent, Montserrat, Nevis, and Tortola, where sugar cultivation has practically disappeared, cotton is becoming a staple crop, Sir Daniel emphasized the fact that in such islands as Barbados, Antigua, St. Kitt's, and Jamaica, where sugar and cotton can with advantage be cultivated on the same land, as rotation crops, the position of the cotton must be that of a subsidiary cultivation.

The lime juice industry and the manufacture of citrate of lime were then dealt with. In Dominica, which exported lime products to the value of £55,174 in 1906, the industry is of primary importance. It is also valuable in Montserrat and Jamaica, and has recently received attention in British Guiana.

The Imperial Commissioner also gave figures in illustration of the remarkable development of the rice industry of British Guiana, and particulars in regard to the growing and export of cocoa-nuts in the West Indies. Rubber cultivation in the West Indies and in British Guiana was referred to, and it was mentioned that some thirty-three estates in Trinidad and Tobago are engaged in the industry.

Reference was made to tobacco growing in the West Indies, and in conclusion the Imperial Commissioner discussed such topics of agricultural interest as the distribution of economic plants from the Botanic stations, Animal industries, Agriculture Loan Banks, Agricultural Shows, prize-holding schemes, and agricultural education.

SUGAR INDUSTRY.

Sugar-cane Experiments in British Guiana.

At the West Indian Agricultural Conference lately held in Barbados, Professor Harrison, C.M.G., Director of Science and Agriculture, British Guiana, read an interesting paper on the results of sugar-cane experiments which are carried on in that colony, under the auspices of the Board of Agriculture. The paper referred especially to the period from April 1906, to September 1907.

Dealing with the manurial experiments with sugar-cane, Professor Harrison stated it had been suggested by some non-resident planters, on the basis of experiments carried out at the Royal Agricultural Society's Farm in England, that the falling off in yield on some cane fields might be due to the souring action on the soil of long-continued applications of sulphate of ammonia. It appears that at the farm in question in England, the land has become absolutely barren as far as the growth of economic plants is concerned, in consequence of the annual application of sulphate of ammonia during the last thirty years. During his recent visit to England, Professor Harrison visited this farm, but experiments carried out in British Guiana on his return failed to indicate that the continued use of sulphate of ammonia for the sugar-cane crop during the past fourteen years in one of the experiment fields had been attended with similar results to those experienced in England.

Indeed, the substitution of nitrate of soda for sulphate of ammonia, as recommended from England, reduced the yield of sugar per acre, both on limed and unlimed land as compared with the return obtained when sulphate was applied. The matter requires further investigation, but as the result of the preliminary experiments, Professor Harrison is of opinion that these tests clearly indicate that on very heavy clay soils, such as that of the experiment field, and under tropical meteorological conditions, the deflocculation, or puddling, which would be caused by long-continued dressings of nitrate of soda, is likely to prove more injurious to the soil than the souring action of sulphate of ammonia.

Cane Farming at Trinidad.

Mr. Edgar Tripp, Secretary of the Trinidad Agricultural Society, has recently sent to the *Louisiana Planter*, a corrected report of the cane farmers' crops of 1907.

On the sugar plantations 373,577 long tons of cane were produced by the planters on their own account, and that purchased from the cane farmers amounted to 169,709 tons. For this purchased cane there was paid $340,527, or about $2 per ton.

The farmers engaged in producing this section of the crop, which was about 30 per cent. of the whole, were composed of 6,557 East Indians, and 5,777 West Indians. From these data it will be seen that the average amount paid for canes to this numerous lot of tenants was very small, 12,334 tenants receiving $340,000, giving less than $30 to each tenant. Still, in its aggregate, this forms a very important feature of the Trinidad sugar industry.

The largest sugar producer among the eighteen sugar houses reported on was the well-known Usine St. Madeleine, the output of which was 13,591 tons, and the Tennant's Estate came next, with a sugar production of 7,037 tons. The total sugar prodection for the year was 50,564 tons.

Sugar Crop Prospects in Cuba.

Later reports on the present season's sugar crop of Cuba are much brighter than those issued a few months ago.

The Havana correspondent of the *Lousiana Planter* describes the great shortage in the crop, which was predicted not long ago, as a purely imaginary one, and states that reliable estimates place the crop yield at not less than 1,250,000 tons. This is slightly less than last year's yield, which, however, was the largest known in the history of the island. Later on, it is stated, it is not unlikely that prospects may still further improve, and last season's crop be even excelled. This possibility is due to the fact that the sugar-cane area of the present year is greater by several hundred acres than that of last season.

Another favourable symptom is the fact that many mills are preparing to grind long before they expected to start, and much earlier than they did last year.

Other estates, having plenty of cane ready for grinding, will be delayed only because they cannot get their new machinery installed in time, but the time lost will, in most cases, be made up by the enlarged capacity of the new equipment.

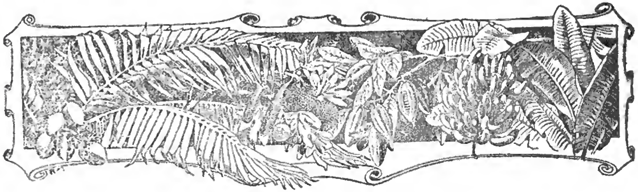
AGRICULTURE IN THE STRAITS SETTLEMENTS.

The following are the most interesting of the notes relating to the agricultural industries of the Straits Settlements, which appear in the *Annual Report* on the colony for 1906:—

Considerable interest has been shown in the cultivation of the oil-grasses—lemon grass and citronella, in several parts of the island, and the development of this industry has been active. The cultivation of indigo and vegetables has increased. Ground nuts are coming into favour again, and some acres are now under this plant. The fruit crops continue to be poor, but the planting of fruit trees appears to be on the increase. Cocoa-nut cultivation increases rapidly.

As to Penang, and Province Wellesley, the rubber trees at the gardens in Penang were tapped, and a fair quantity of seed was sold to planters. Agricultural prices were, on the whole, better than in 1905, while tapioca reached the highest point recorded for many years. The paddy harvest was a fairly good one, but the fruit crop was, as in Singapore, poor. Para rubber and cocoa-nuts are gradually superseding sugar on nearly all the estates in Province Wellesley, except those of the Penang sugar estates.

Tapioca cultivation has largely increased in Malacca, and planters of tapioca are now compelled by the conditions of their titles to plant fruit trees, cocoa-nuts, or rubber through the crop, in order to ensure permanency of cultivation. Land planted with tapioca alone soon gets exhausted, and when abandoned becomes a waste covered with lalang grass. Immense tracts of such land have been abandoned in the past, but are now being taken up rapidly for rubber. Small cultivators are enabled to plant rubber by utilizing tapioca or gambier as a catch crop to tide over the years which must elapse before rubber makes any return, and the consequence is that small rubber plantations are springing up all over the Settlement.



WEST INDIAN FRUIT.

FRUIT INDUSTRIES OF JAMAICA.

In his latest report, the special agent of the U. S. Department of Commerce and Labour gives extensive details with regard to the various agricultural industries of Jamaica. The chief particulars relating to the production and export of bananas, citrus fruits, and cocoa-nuts, are here reproduced as being of more special interest:—

Bananas are extensively cultivated, forming at present the chief industry, and the leading product of export. For the successful culture of the banana, heat, moisture, and rich soil are necessary, all of which requirments are liberally afforded the planter in Jamaica. It is estimated that the cost of planting an acre of bananas on hitherto uncultivated land is about $57, and 339 stocks are planted to the acre. The present area under cultivation in this fruit is officially given at 59,958 acres

Oranges yield abundantly with little or no cultivation. Improved methods of sorting and packing are being adopted and exports are gradually increasing. During the fiscal year 1906, a considerable increase occurred in shipments to the United Kingdom and Canada, while in the shipments to the United States there was a decrease. Of the output for the fiscal year 1907, 18,000,000 went to the United States, 50,000,000 to England, and 10,000,000 to Canada. The cultivation of grape-fruit, previously gathered only from wild trees, received an impetus some years ago owing to the demand of the United States market, although this is now supplied by Floridian and Californian groves. The fruit has become popular and exports for 1906 show a valuation of $14,324.

Lime trees grow wild on the pasture lands and yield fruit of good quality even on poor soil. As is the case of pine-apples, the exports, however, show a constant decrease both of fruit and of lime juice: 188,947 gallons of lime juice were exported in 1902, and in 1906 only 79,822 gallons valued at $15,374.

Cocoa-nuts are grown in nearly every portion of the island, the yield per tree being estimated at 100 nuts. The hurricane of 1903 devastated the cocoa-nut plantations greatly, the present yield being somewhat less than one-third that of four years ago. Careful replanting has, however, been done, and earnest efforts are being put forth to restore and extend cocoa-nut cultivation. About 300,000 more cocoa-nuts were gathered last year than in the year preceding. The shipments are given at 7,092,298, the valuation $138,044. Statistics for the fiscal year 1907 give the value of total exports of cocoa-nuts at $215,000, divided as follows: United States $150,000, United Kingdom $15,000, and Canada $50,000.

HINTS TO ORANGE GROWERS.

The *Porto Rico Review* of December 7 last contained an article which gave valuable advice to orange growers of that island, as to the best methods to be followed in order to secure high prices for their produce. Some of the hints are worthy of consideration by growers outside of Porto Rico, and are reproduced herewith :—

Growers must work together and exert an active, united influence in promoting better methods of culture, transportation, packing, etc.

They must establish certain grades for their fruit, and, as far as possible, see that these are observed by everyone. One man sending in poor fruit labelled 'Fancy' will cause loss to all.

The shippers must exercise more care in the packing and handling of the fruit while in their hands.

The growers must individually exercise more care in the gathering of their fruit. At present the fruit is gathered far too green, is pulled from the trees, and even gathered by more violent methods. Fruit gathered at the proper time for high quality should be clipped off with shears and laid carefully into the receptacles. Careful gathering and handling mean extra expense, but this extra expense becomes less and less as better preparation is made for the work and the men become more skilful. Further, the increase in market value of $1·00 to $3·00 per box will more than pay for this extra cost. Then, too, the market of the future must be prepared for. It has become axiomatic that the certain as well as the best profits come to him who puts a really fancy grade of fruit on the market. No matter what are the ruling prices, such a grower has always a special market and obtains special prices.

Growers must be ever on the alert to find new markets and create increased demands. Growing and marketing are fast being recognized as distinct branches of the fruit industry each demanding its special qualifications. The plan that has sometimes been adopted of banding together and employing a special agent to attend to the marketing is well worthy of consideration. The right kind of man in such a place can keep in touch with all the markets, learn what the trade demands, and in many ways greatly promote the profit as well as the development of the industry.

CULTIVATION OF PINE-APPLES.

The *Quarterly Journal* of the Bengal Department of Agriculture (October 1907) discusses the chief points connected with pine-apple growing, and gives some useful hints concerning methods of preparation of land, manuring, propagation of plants, planting, and after-cultivation.

It is laid down that the most important point to be borne in mind in pine-apple cultivation is the proper selection of the soil. Satisfactory growth of the crop depends more upon congenial physical conditions of the soil than upon its chemical composition. The land must be of a loose and open nature, and above all, must possess free natural drainage. The presence of stagnant water around the roots is especially detrimental to the health and prosperity of the plants. This indicates the advisability of planting only on land with a porous subsoil.

The number of years during which a pine-apple plantation will stand and give good results depends upon the thoroughness of the original cultivation. Before planting operations are started, it is recommended that the grower should have the ground thoroughly trenched to a depth of about 14 inches, and well cleared of all roots, etc. The surface should be reduced to as perfect a tilth as possible. These operations will sweeten the land, improve its drainage, and make it more retentive of moisture during drought. If thoroughly done, too, the plantation will flourish a longer time before replanting is needed—an important point to remember, since frequent replanting adds considerably to the cost of upkeep.

Potash appears to be the most important element required by the pine-apple crop. This may conveniently be added to the soil by means of occasional applications of wood ashes. Phosphates are required in much smaller quantity than potash, and when needed, may be given in the form of a light dressing of bone meal. Superphosphate is described as an unprofitable fertilizer for this crop.

A good supply of nitrogen, important for the proper development of the plants, is best provided by growing and ploughing in some leguminous crop, such as cow peas, woolly pyrol, or ground nuts. The physical texture of the soil is also improved by the green manure.

The various means of propagating pine-apple plants by 'suckers,' 'slips,' 'crowns' and 'stumps' are referred to, the use of 'suckers,' i.e., shoots springing from near the base of the parent plant, being preferred by most planters, on account of the earlier return of fruit obtained by this means. 'Slips' grow from the base of the fruit, and often give rise to excellent plants. 'Stumps,' or old plants which have already fruited, are frequently replanted for the sake of the vigorous suckers which spring from them. Whatever means of propagation is employed, it is important that only pines of first-rate quality be used as parent plants, since it is only by adherence to this rule that a high standard of produce can be maintained.

Before planting, the lower leaves should be removed from the slips or suckers, and it is advised that they should not be set too deep, and that care should be taken to prevent any earth getting into the hearts of the young plants, since this will almost certainly destroy them.

Considerable diversity of opinion exists as to the distances at which the young pines should be planted, but a plan generally adopted is to set out the scions in rows about 9 feet apart with a spacing of about 2 feet from plant to plant in the rows. The advocates of close planting assert that their method leads to early maturity and less necessity for weeding between the plants, while, on the other hand, it is claimed that stronger and healthier pines can be secured by allowing wider spacing.

Constant and thorough surface cultivation is necessary for the best results to be obtained in pine-apple growing. In large plantations the horse hoe should be used as much as possible between the rows until the plants have spread and occupied the whole space, and hand-hoeing between and around the plants should be followed up in all cases.

AGRICULTURAL PROGRESS IN THE WEST INDIES.

The following is the concluding portion of the Presidential address delivered by Sir Daniel Morris at the opening of the recent Agricultural Conference:—

I have given a brief review of the position and prospects of agricultural effort in the West Indies during the last few years. My object has been to uplift the West Indian Colonies into the view of one another and into the view of the Mother Country and Canada, and of capitalists and markets everywhere. Many of the facts brought forward will be supplemented in fuller detail by information to be laid before this Conference by those who have taken so active a part in the work. In estimating the results of previous Conferences, I believe we are justified in regarding gatherings of this character as of the greatest possible value in organizing our efforts and maintaining them on uniform lines so as to produce the best results. There is now harmony of action and sympathetic interest taken in agricultural matters in all portions of these Colonies. The West Indies have shown that they are capable of steadily responding to a scientific utilization of their resources. They have also fulfilled the reasonable hopes that have been entertained in regard to the possibility of improving old, and the successful development of new industries. Twenty-four years ago in a paper read before the Royal Colonial Institute, I endeavoured to place before the English people reasons for believing that there was even then a prospect of the West Indian Colonies entering upon a more prosperous career. Twenty years ago in an address delivered before the London Chamber of Commerce, I expressed confidence—a confidence in which I have never wavered—that there was a hopeful future before these Colonies, and that it was within the power of the people themselves to realize that future, and to bring back something of the former affluence of the West Indies.

Since then we have gone far and 'done things.' We have interested one of the largest manufacturing industries in Great Britain in our welfare. We have been told 'that if it had not been for the fine Sea Island cotton produced in the West Indies during the past few years, it is probable that a good many of the mills in Lancashire using the finer grades of cotton would have been obliged to work short time owing to the scarcity of the raw material.'

Still more recently, we have attracted the attention and warm sympathy of our vigorous and thriving kinsfolk in the Dominion of Canada, and there are possibilities in that direction also that may be pregnant of good to the West Indies.

A strong pull and a long pull should enable us to overcome many of the difficulties that now confront us. We would thus place the West Indies in the way of taking full advantage of the numerous and valuable resources which, as I have shown, are lying easily within their reach.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland write as follows, under date of January 6, with reference to the sales of West Indian Sea Island cotton:—

> Since our last report no transactions have taken place in West Indian Sea Islands.
>
> American Sea Islands are being firmly held for fancy prices, but buyers are holding off.

SEA ISLAND COTTON CROPS.

Practically the whole of the American Sea Island cotton crop has now been gathered and ginned, and in its December number, the *Cotton Trade Journal* devotes an article to the discussion of the size of the past season's crop. The accompanying notes are quoted from this article:—

> Among the men who have made a study of the crop from an official standpoint in the Sea Island Cotton Growers' Association, is Mr. J. R. Williams of Alachua, Florida, who has received reports from members of that association in both Georgia and South Carolina. Mr. Williams makes this crop out to be 70,000 bales. He is of opinion that Florida has made less cotton than last year, while he estimates that Georgia and Carolina have each made more than they did last season.
>
> 'I do not think the Florida crop will exceed that of 1906,' he writes, 'while our reports show that Georgia and Carolina will make more. It looks as if this year's Sea Island crop will be about 70,000 bales.'
>
> The Sea Island crop in sight to date is 30,324 bales, against 23,511 last year; 47,582 two years ago; 51,101 three years ago; 36,683 four years ago, and 30,324 five years ago.
>
> The character of the crop has surprised some of the trade in view of the fears early in the season that its quality would be uncertain, possibly very low as an average, owing to the large amount of replanting done with seed of unknown worth. It usually requires the greatest of care in seed selection to make a good Sea Island crop, and as this was impossible owing to the large and unexpected demand for planting seed, anything that could be obtained was in some cases put in the ground. Hence, the trade did not know exactly what to expect.
>
> Over on the Carolina Islands they have done fairly well this season with their Sea Island crop. Mr. T. M. La Roche, writing from Edisto Island early in November, reported: 'cotton has stopped opening here, and this is serious, as quite a percentage of the crop is yet to mature. The percentage of lint is quite below normal for some unknown reason, and to such an extent that the final yield of the crop must be affected.'

MANURES FOR SEA ISLAND COTTON.

Reference has been made in late numbers of the *Agricultural News* to a valuable little publication issued by the United States Department of Agriculture under the title of 'Sea Island Cotton' (forming *Farmers' Bulletin 302* of the publications of the Department). The general rules and principles give below, as to the use of manures for Sea Island cotton, are taken from the pamphlet in question, and should be of considerable interest to cotton growers in these islands:—

> In connexion with the application of fertilizers to the Sea Island cotton crop, the following general rules should be remembered:—
>
> (1) The best results from the use of fertilizers can be had only when the soil has been put in first-class physical condition by deep ploughing and the addition of vegetable matter.
>
> (2) Stable manure and compost made on the farm are cheaper and far more effective and lasting than commercial fertilizers.
>
> (3) The market value of commercial fertilizers is based on the nitrogen, potassium, and phosphorous they contain. The farmer should buy only the quantity of each element that will give the most profit on his soil.
>
> (4) The amount of each element required varies with the soil so much that two parts of the same field often require different fertilizing.
>
> (5) The proper fertilizer formula cannot be told from a chemical analysis of the soil or of the plant, but an opinion can be formed from the appearance of the crop and verified by field trials.
>
> (6) More plant food can be purchased for a given sum in high-grade fertilizers than in low-grade brands. Buy the best and use less per acre.
>
> Sea Island cotton requires less nitrogen than most crops, especially on low and moist soils All excess of this element stimulates vegetative development, resulting in tall, coarse, and relatively unproductive plants, with large, dark-green leaves. A lack of nitrogen is shown when plants are small, with a light yellowish-green cast of foliage.
>
> The usual sources of nitrogen, or ammonia, are cotton-seed meal, dried blood, tankage, fish scrap, nitrate of soda, and sulphate of ammonia. Nitrogen is the most expensive ingredient of fertilizers, costing 16c. to 18c. per lb. as compared with 4c. to 5c. for potash and phosphoric acid, and for that reason should be supplied mainly by rotation with legumes. The effect of cow pea or velvet bean stubble ploughed in at the Alabama Agricultural Experiment Station was to increase the next year's cotton crop 63 per cent., this figure being the average of four tests. In such cases it is

often unnecessary to purchase nitrogen, except that it may be profitable to apply about 50 lb. of nitrate of soda before planting, to stimulate the young seedlings to rapid growth. When commercial fertilizers are relied on, the nitrogen is best derived from the cotton-seed meal or other organic materials, such as tankage or dried blood, which become available more slowly and are more lasting in their effects than the quickly soluble nitrate of soda or sulphate of ammonia.

A liberal supply of potash is very important for Sea Island cotton, and farmers outside of the Sea Islands use too little of it. Potassium influences the formation of starches and sugars in the plant and appears to be indispensable for protein formation. The lack of it in the case of Sea Island cotton may lead to the appearance of 'rust,' a disease resulting from disordered nutrition. Fields or parts of fields known to be subject to rust should receive an additional application of potash, in amounts varying in accordance with the severity of the disease. Kainit is the most common source of potash, but as it contains only 12 per cent. of potash it should be applied liberally. Muriate of potash contains 48 per cent. of potash, and is more convenient on account of its concentration and is usually considered to be proportionately effective. Fifty pounds of muriate of potash per acre would thus be equivalent to 200 lb. of kainit.

This element, in the form of phosphoric acid compounds, is indispensable to the Sea Island cotton plant for its general development, and especially for the seed and lint. Most soils are deficient in phosphorous, which is therefore an important ingredient of fertilizers. Acid phosphate is the usual source, and on account of its low price forms an unduly large proportion of the average fertilizer. With the exception of occasional applications of marl, on the Sea Islands, lime is not used by cotton growers, and there is little evidence that it would be profitable.

AGRICULTURE IN THE LEEWARD ISLANDS.

Interesting details relating to cotton, lime, and cacao cultivation in the Leeward Islands are contained in the *Annual Report* (1906-7) on the colony, which bears evidence to the very considerable progress that has been made of late in connexion with these industries. Extracts from the *Report* are given herewith:—

The cotton industry continues to make very considerable progress, and is now regarded as one of the most important staples of the Leeward Islands. The season, on the whole, has been an unfavourable one for cotton throughout the West Indies, but the industry appears to have been little checked thereby. The quality of the cotton, particularly in Antigua, has been considerably improved during the last year or two.

At Antigua, several estates that have not been under cultivation for very many years, have been cleared and planted in cotton. A number of young men have purchased land and settled in the island with the intention of planting cotton. Some of them are now reaping remunerative crops. Two additional ginneries have been erected, and the ginnery hitherto profitably worked by the Department of Agriculture has been transferred to a company. There is thus much activity in connexion with this industry.

In St. Kitt's, the industry is very successfully carried on in conjunction with sugar; owing to the easily worked character of the soil of the island, a crop of cotton can be grown on the sugar fields immediately before the sugar crop is planted, thus dividing the cost of cultivation between the two crops. Cotton has thus, in this island, become a valuable ally to sugar.

In Nevis, a large area, some 1,700 acres, was planted in cotton, but, owing to unpropitious seasons, the crop is but a small one. There does not appear, however, any disposition to abandon the industry, which will be vigorously carried on for the next year's crop.

In Montserrat, the industry has been quite successfully carried on and has now become a principal industry, ranking in importance with lime juice.

Very considerable progress in cotton growing has been made in Anguilla, resulting in most marked changes in the welfare and condition of this small island, which has thus been restored to a degree of prosperity beyond what it has enjoyed for a great number of years.

Owing to conditions peculiar to the island, the crops of cotton are not heavy; they are however, quickly, and cheaply grown, and are of excellent quality. Over 1,100 acres are now under cotton, and there are three ginneries at work.

The cultural work has largely been under the direction of the officers connected with the Imperial Department of Agriculture, to whose efforts the successful field work, the combating of pests, and the improved quality owe much. The Department watches the industry very closely in all its stages, and is engaged in experimental work connected with the improvement of the quality of cotton, the selection of seeds, and the study of the various pests to which the crop is subject. The manner in which the cotton growers and the Department of Agriculture have worked together forms one of the most striking illustrations of the functions and usefulness of such a Department.

The lime industry both in Dominica and Montserrat is in a satisfactory condition and continues to make steady advance. From both Presidencies citrate of lime is now being shipped on a large scale. The production of this article is held to be an improvement on the manufacture of concentrated lime juice. Concentrated juice is, however, still shipped in large quantities. Considerable quantities of raw juice are also shipped from both islands, for use in preparing beverages. Lime fruits are also exported in increasingly large quantities to Europe and America. Pickled limes also form an article of export. The essential oils prepared from the lime, either by hand or by distillation, constitute exports of some importance.

Cacao continues to be one of the most important industries in Dominica, where the cultivation is being steadily extended. The Imperial Department of Agriculture has under its control a large number of experimental plots for the cultivation of cacao in various districts of the island, designed with the object of ascertaining the effect of various manures and different methods of cultivation on the crop. Some of these experiments have given highly interesting results, demonstrating that the productiveness of the cacao tree can be very greatly increased. The results obtained in certain of these experiments have attracted wide attention and are likely to have considerable influence on the methods of cultivation. The details are given in the *Annual Reports* of the Dominica Botanic Station and in the *West Indian Bulletin*.

The Imperial Department of Agriculture has continued investigations on the pests and diseases affecting cacao, and advises as to their control.

In Nevis, small pioneer cacao plantations are making good progress: small crops will soon be reaped. It is not, however, probable that any considerable area of Nevis will be found suitable for cacao.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial of the present issue gives a summary of the Presidental address delivered by Sir Daniel Morris at the recent West Indian Agricultural Conference.

The notes on the sugar industry (page 19) relate to manurial experiments with sugar-cane in British Guiana, the extent of the cane-farming industry in Trinidad, and crop prospects in Cuba.

Figures indicating the extent of the fruit industries of Jamaica appear on page 20, and an article on the following page gives useful hints in regard to pineapple cultivation.

The manurial requirements of the Sea Island cotton crop are discussed in an article on page 22.

The *Annual Report* (1906-7) on the Leeward Islands contains interesting information relating to agricultural progress in the colony (page 23).

The question of the best method of preparing rubber for the market receives attention in an article on page 29.

Agricultural Wealth of Panama.

The district around the Port of Bocas del Toro in Panama is reported by the U.S. Consul to possess very considerable agricultural wealth. The cultivation of bananas is the chief industry, thousands of acres having lately been planted. Other products, such as cacao, rubber, cocoa-nuts, sarsaparilla and vanilla are described as doing well in the district, although their cultivation has not been developed to any great extent.

Cacao is at present grown only by the natives, who dry the beans in the sun, using no special apparatus.

Rubber grows wild in the interior districts. A certain amount of this commodity is prepared and brought to Bocas del Toro by the Indians, where it is readily bought up by merchants. Sarsaparilla also grows wild in the interior and is gathered by the natives Vanilla grows well, but the damp climate causes difficulty in curing.

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The Popular Banana.

Banana cultivation, the banana industry of Jamaica and other countries, and the imports of this fruit into Great Britain and the United States form the subject of an interesting article in a late number of the Liverpool *Journal of Commerce.*

The remarkable development of the banana trade of Jamaica during late years is described, the figures given, which are quoted from the Inland Revenue *Report* of the island showing that during the nine years from 1896 to 1905, the banana area of Jamaica had increased from 19,227 to 44,325 acres.

British imports from Jamaica in 1905 reached 1,200,000 bunches of bananas—a vast increase compared with the 500,000 bunches imported in 1901.

Costa Rica has of late years become the premier banana-producing country of the world, and in respect to quantity shipped, heads the list of countries exporting the fruit to England, sending no less than 2,061,705 bunches in 1905.

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Destruction of Locusts in Trinidad.

The Locust Destruction Ordinance that has been in force up to the present in Trinidad provides for the destruction of locusts at the expense of the Government only. The effect of this has been that when destruction of locusts becomes necessary, owners of infested areas have left everything to be done by the Government agents.

An amendment to the Ordinance, however, has received the approval of a Select Committee of the Legislative Council, and will probably soon become law. This proposes that a notice shall be served on the owner or occupier of lands troubled with locusts, ordering him to take measures for the destruction of the pests within a given time, at his own expense. If this order is not carried out within the time allotted, the agent of the Government may enter the lands, and destroy the locusts, the expense of this operation being charged to the owner or occupier, unless the Governor shall direct otherwise.

Strength of Timber as influenced by Moisture.

A large amount of interesting information dealing with the influence of moisture upon the strength of different kinds of timber, is contained in a pamphlet recently issued by the Forest Service, U.S. Department of Agriculture.

From a consideration of the particulars given it is at once evident how very different degrees of strength may be given to two boards of the same piece of timber by different methods of seasoning.

One of the first results of the seasoning of wood is the evaporation of the moisture contained in the interior of the individual cells. This naturally lessens the weight of timber, but it is not until the moisture in the substance of the cell-walls themselves begins to evaporate, that the strength of the timber is affected. When the cell content of water has evaporated, but the moisture in the substance of the ceil walls is still present, the wood is at what is known as 'fibre saturation point,' and from this stage to absolute dryness there is a remarkable gain of strength in the wood.

Exposure to atmospheric conditions may bring about a reabsorption of moisture, but still if proper seasoning has taken place, most woods remain from 50 to 150 per cent. as strong as when in the green condition. The importance of care in seasoning timber is therefore at once evident.

Labour Conditions in British Guiana.

A note in the *Agricultural News* (Vol. VI, p. 392), commented on the labour difficulty in British Guiana, and the effect of the developing rice industry in attracting the East Indian immigrants from work on sugar plantations.

In its review of the agricultural conditions in the colony during 1907, the Demerara *Argosy* reverts to this subject, and states that, in spite of the offer of increased wages, cane growers were unable to carry out the tillage operations at the proper time, and during the reaping season it was found impossible to keep the mills regularly supplied with canes.

The number of East Indians at present resident on sugar estates in British Guiana is given at 71,000, and of these a large number devote a considerable portion of their time to rice growing. There are some 63,000 coolies not resident on sugar estates, but employed in connexion with other industries.

The *Argosy* refers to the fact that other agricultural industries, as rubber, fibre, and limes are beginning to show signs of development, but remarks that, under present labour conditions, it is impossible for any one industry to make an important advance except at the expense of others.

It is unfortunate that this difficulty exists in a colony which possesses so many possibilities of development, since capitalists will necessarily be shy of investing capital in a country where the labour supply is insufficient for the industries already established.

Interesting Citrus Fruits from Tobago.

Mr. D. Macgillivray of Tobago recently forwarded two interesting specimens of citrus fruits to the Imperial Commissioner of Agriculture. One was a Labuan pomelow, which Mr. Macgillivray has succeeded in propagating in Tobago. These pomelows, he states, are usually thornless and seedless. Cuttings supplied by Mr. Macgillivray have been raised at the Trinidad Botanic Gardens

Mr. Millen of Tobago also obtained cuttings of the pomelow, and has been successful in propagating the plants by budding on sour orange stocks.

The second fruit sent has the shape of a shaddock but is very rough-skinned. It is from a seedling of the pomelow tree, and is thought to be the result of a cross between the pomelow and a sweet orange. Both fruits are possessed of an excellent flavour.

West Indian Bulletin.

A new number of the *West Indian Bulletin* (Vol. VIII, No. 3) has just been issued from the press. It contains papers relating to Animal Industry, Agricultural credit and loan banks, Agricultural Education, and one or two papers on miscellaneous subjects, which were to have been read at the Jamaica Agricultural Conference of 1907.

The Hon. B. S. Gosset's article 'Indian Cattle in Jamaica,' gives a considerable amount of useful information concerning the different breeds, and their value from the point of view of the dairy and as beef producers as well as animals of draught.

Interesting particulars in reference to horse and mule breeding in the island are contained in Mr. S. C. Burke's paper 'Horses and Horse Breeding in Jamaica,' while any agriculturist who may be thinking of taking up dairy work in the colony, will find Mr. T. P. Leyden's article 'Dairying in Jamaica,' full of useful information and valuable suggestions.

The subject of agricultural education, in different aspects, is discussed in no less than ten papers in this number. The Revd. Canon Simms, M.A., writes on 'Agricultural and Scientific Teaching in the Secondary Schools of Jamaica'; the Hon. H. H. Cousins, M.A., F.I.C., discusses the difficulties in the way of establishing a thorough scheme of agricultural education in Jamaica, while the Hon. T. Capper, B.A., B.Sc., describes the work done through the medium of Nature Study, School Gardens, etc., to extend agricultural knowledge in the elementary schools of Jamaica.

The conditions of agricultural education in Barbados are reviewed in two papers, by his Lordship the Bishop of Barbados, and by the Revd. H. A. Dalton, D.D., respectively, the former discussing the subject generally, while Dr. Dalton's paper is confined to the work done in Secondary Schools.

It is worthy of mention that a Conference number of the *Bulletin* (65 pages) containing a summary of the proceedings of the Conference of 1908 was issued on Tuesday, January 15, the day after the Conference closed.

INSECT NOTES.

Throat Bot Fly in Cuba

The accompanying note on the occurrence of the throat bot fly in Cuba is published in the report of the proceedings at the recent Conference of the U.S. Association of Economic Entomologists:—

Although the horse bot (*Gastrophilus equi*, Fab.) is commonly known in Cuba, it does not appear that *G. nasalis* has yet been reported. Specimens of the latter had been obtained from Texas, Kansas, and Wyoming. Now it has been taken flying about the plough mules here on the grounds of the Agricultural Station.

This occurrence is specially interesting, because with it may be noted an apparent divergence in habit. Ordinarily it has said to annoy animals by striking for the vicinity of the neck for the deposition of its eggs. Here, as we have observed, it flies almost entirely beneath the body. Whether this shows any definite indication of a difference in the egg-laying habit remains to be determined.

The House Fly.

In a pamphlet recently published by the Health Committee of the City of Liverpool, Mr. Robert Newstead has given the results of investigations carried out by him into the life-history and breeding habits of the common house fly (*Musca domestica*).

This insect is so well known that it may seem strange that there is anything new to learn in reference to it. Mr. Newstead, however, has been able to produce some new and interesting facts. He finds that the fly breeds in fermenting vegetable matter in preference to any other. Stable manure provides the best material, but ash pits containing refuse of various sorts also contained the maggots though in a far less degree. The fly does not breed, like the blue-bottle and many other carrion feeders, in decaying animal matter. The maggot stage varies much in its duration, being shortest (about a week) in warm, fermenting media, and this points to the desirability of emptying ashpits, etc., at frequent intervals. Poultry search very greedily for the grubs, and thus help to keep the number of flies down in places where stable manure or other litter accumulates.

The information thus gathered by Mr. Newstead is of considerable economic value, as indicating the best means of preventing the rapid multiplication of so troublesome a pest.

Now that the breeding habits of this pest have become known, it is more possible to devise suitable means for its destruction, and at a time in its life-history when it is most vulnerable.

Preventive measures become the more imperative when it is remembered that besides the annoyance which it causes, the house fly is one of the common agents responsible for the spread of certain diseases, owing to the filthy habits of feeding which characterize the adult insect.

An Insect Pest and its Parasite.

The following interesting note, published in the *Report* of the U.S. Association of Economic Entomologists, was contributed by Mr. C. F. Baker of Cuba :—

A common fruit which occurs in gardens in Cuba is the tree gooseberry, (? *Phyllanthus Emblica*). This tree is completely and rapidly defoliated by a most pernicious pest the larva of *Melanchroia geometroides*, Walk. As far as I had observed until recently none of the parasitic enemies of this insect appeared to exercise any check upon it. One day however in visiting a tree swarming with the larvae and almost defoliated, I discovered that numbers of them were dead and dying, their blackened skins hanging from the tree or lying on the ground beneath. Drawing nearer I found that the larvae were being attacked by a very small sucking fly, from one to half-a-dozen being perched on each larva on which they remained until it was sucked dry. Mr. Coquillet has kindly determined this fly as *Ceratopogon eriphorous*, Will., previously reported only from the island of St. Vincent. This mosquito like method of attack and its remarkable efficacy is very novel and interesting.

Sleeping Sickness Conferences.

A second International Conference on Sleeping Sickness was to have met at the British Foreign Office on November 1 last, but this gathering has been postponed for a time.

The London *Times* states that this is in deference to the wishes of the German Government, which has pointed out the advantage that would be gained if their delegates were in a position to submit to the Conference the fruits of the recent labours of Professor Koch. Professor Koch has lately been engaged in an exhaustive inquiry into the question of Sleeping Sickness, and has spent a considerable time in the infected districts of Africa. He has now returned to Berlin, where he is at present engaged in the preparation of his report.

As this work must necessarily occupy a considerable time, the Conference is unlikely to assemble before the middle of February.

The *Times* also states that an independent Sleeping Sickness Committee, with Sir Alfred Jones as Chairman, has also been formed at Liverpool. This Committee has for its object the collection of information dealing with Sleeping Sickness, the stimulation of research into the cause, method of transference, and cure of the disease, and the publication, from time to time, of communications with reference to it. The Committee includes the names of several eminent scientific and medical men.

RUBBER AREAS OF DIFFERENT COUNTRIES.

At a meeting held not long ago in Mexico City, of Mexican rubber planters, Dr. Pehr Olsson-Seffer made the following statement in reference to the areas of planted rubber in Mexico and in other countries of the world :—

From data at hand I would consider the world's area of rubber plantations to be 355,000 acres, distributed as follows : Mexico, 95,000 acres ; Malay Peninsula, 92,000 ; Ceylon, 85,000 ; Africa, 30,000 ; Central America, 14,000 ; Java, 10,000 ; India, 8,200 ; Brazil, 6,000 ; Venezuela, 6,400 ; Ecuador, 3,000 ; Borneo, 2,000 ; Colombia, 1,800 ; and West Indies, 1,600.

ANALYSES OF CONDENSED MILK.

It may be of some interest to consumers and others to reproduce the results of analysis of several samples of the various classes of condensed milks on the market. It is believed that these figures, which were published in the *Chemical News* on November 8 last, by Mr. F. J. Lloyd, F.I.C, a well-known public analyst in England, are representative of the composition of the different classes of milk.

Analyses of five samples of machine-skimmed condensed milk show that fat may vary from 0·30 to 1·26 per cent.; casein, 9·05 to 11·10 per cent.; sugar, 62·77 to 65·94 per cent.; ash, 2·26 to 2·48 per cent; and water, 20·26 to 24·66 per cent. Boric acid was found in each sample, being present to the extent of from 0·25 to 0·43 per cent. No other preservative, such as formalin or salicylic acid, was found present.

In three samples of full cream (sweetened) condensed milk examined, the fat ranged from 8·20 to 11·13 per cent.; casein, 8·36 to 10·95 per cent.; sugar, 58·21 to 65·46 per cent.; ash, 2·0 to 2·84 per cent.; water, 13·04 to 18·70 per cent. Boric acid was present in small quantity in two of the samples.

A full-cream unsweetened condensed milk was found to contain fat, 10·13 per cent.; casein, 10·86 per cent.; sugar, 9·55 per cent.; ash, 1·74 per cent; water, 67·72 per cent.

Here it may be mentioned that the average composition of cows' milk may be taken as: Fat, 3·75 per cent.; casein, 3·10 per cent.; albumen, 0·54 per cent.; milk sugar, 4·80 per cent.; ash, 0·7 per cent.; or, total solids, 12·89 per cent; water, 87·71 per cent.

CABBAGE GROWING FOR STOCK IN CUBA.

A late number of the *Boletin de la Secretaria de Agricultura* contains an article dealing with the growing of cabbages as a food for live stock in the island of Cuba, where this cultivation has been introduced from the United States.

The cabbage which has been acclimatized in Cuba is a well-known variety of English origin, known as the Dwarf Essex cabbage. It yields a large quantity of nutritious and succulent food, which is much appreciated by all kinds of live stock.

This cabbage is stated to flourish on all kinds of soil in Cuba, except on very moist clay soil. The seed is sown during the later months of the year, or in January, February or March of the following year, in furrows from 36 to 40 inches apart, this distance leaving ample space for the passage of tillage and weeding instruments between the rows of cabbages.

When the cabbage seed is drilled in rows, about 2½ lb. are used per acre; when sown broadcast twice this quantity is required.

Growers in Cuba who raise this crop as a stock food cut, each morning, just the quantity required for the day's food of the live stock. If cut and not consumed till the following day, the cabbages become dry and unpalatable.

The practice followed is to cut the cabbages about 4 inches above the ground; the stumps bud again and a second crop is obtained.

The enormous amount of stock food yielded by this crop in Cuba will be understood when it is stated that a weight of nearly 150 tons per acre per annum was obtained on land which had only received a small amount of farmyard manure together with a light dressing of potassium chloride.

When fed to sheep and pigs, the cabbages can be simply placed in the open field, the animals being allowed to eat them at will. It is mentioned, however, that in feeding to cattle the best results are obtained by giving the cabbages in conjunction with other green food, or with corn. In connexion with milking cows, it is well known that if fed in any quantity, cabbages impart an unpleasant flavour to the milk of these animals.

The writer of the article states his conviction that, with improved knowledge on the part of stock owners of the value of the crop in raising and fattening cattle and other kinds of live stock, cabbage culture will be largely extended in most countries where stock keeping is carried on, and the results which are reported from Cuba should certainly encourage stock owners to at least devote a small area to an experimental cultivation of the crop.

AGRICULTURE IN THE VIRGIN ISLANDS.

At a meeting held at the Court House, Road Town, Tortola, on December 4 last, the Hon. Francis Watts, C.M.G., D.Sc., Superintendent of Agriculture for the Leeward Islands, delivered an address dealing with the agricultural resources of the Virgin Islands. His Honour the Commissioner, Dr. Earl, presided over the gathering, which included the Revd. H. Eister, the Revd. C. R. Trace, and Mr. W. C. Fishlock the Agricultural Instructor Mr. Fishlock has forwarded the accompanying account of the proceedings:—

Dr. Watts sketched the progress of the cotton industry in the Presidency from the beginning to its present state of development. He described the chief difficulties met with by planters who set out to grow cotton crops of high quality, and pointed out the great need of care and watchfulness on the part of the growers.

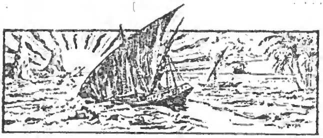
The speaker assured those present that the Department of Agriculture was anxious to do everything possible to encourage and assist the development of the cotton industry, and in this connexion he referred to the recent improvements at the cotton factory under the control of the Department. At this factory enlargement had lately been made and a new oil engine is being procured, the total expenditure being about £250.

Last year, cotton to the value of about £350 was purchased by the factory from small growers, but it was stated by Dr. Watts that this year the Department expected to buy about twice that amount.

Interesting reference was made to the question (discussed in a recent number of the *Agricultural News*, Vol. VI, p.395) of the possible establishment of a small cacao industry in the Virgin Islands. It was suggested that much useful information might be obtained if cacao plants were experimentally grown in the more favourable localities of the islands, in the hope that the same success might attend these trials as was obtained with the cacao plots at the Experiment Station.

Dr. Watts also spoke encouragingly of the efforts which are being made to establish a lime industry in the Virgin Islands. Up to the present, something has been done by buying up fruit from small growers, and manufacturing concentrated lime juice. This is a new source of profit to small growers, for in the past limes have to a large extent simply rotted under the trees.

In conclusion a hearty vote of thanks was accorded Dr. Watts for his helpful and valuable address.



GLEANINGS.

The exports of pimento from Jamaica during 1907 reached 85,000 cwt., valued at $380,000. Of this, the United States took 40 per cent.

The average rainfall that occurred in the Virgin Islands during 1906-7 was 53·62 inches, as compared with an average of 55·66 inches over the past five years.

The average rainfall experienced in British Guiana during the year 1907 reached 120 inches. The average for the first six months of the year was 84 inches.

The land under sugar-cane cultivation in British Guiana during 1907 was 73,471 acres, exclusive of about 2,500 acres cultivated by farmers. The area under seedlings, as already indicated, is over 30,000 acres.

An ostrich farm has been started in Cuba as an experiment. At present the owner possesses about forty-eight ostriches. The value of the full-grown birds is from $300 to $400 each.

Ginger exports from Jamaica during 1906-7 showed a falling off in quantity, but there was an increase in value of nearly £11,900 as compared with the shipments of 1905-6.

Jamaican grape fruits of medium size are retailed in London at 4*d.* each, while the larger sizes fetch as much as 8*d.* each. (*London Daily Mail.*)

The sugar crop of Porto Rico for the year 1906 amounted to 205,000 tons. This indicates an increase in sugar production of 200 per cent. in the last five years.

The United States Consul at Odessa reports that in his district refined cocoa-nut oil is being largely sold as a butter substitute. Oleomargarine, a well-known substitute composed cheifly of animal fats, has quite been driven from the market.

Thirty-three bales of Sea Island cotton and 136 bales of Marie Galante were ginned at the Government Cotton Ginnery, Hillsborough, Carriacou, during the year 1906-7. (*Annual Report.*)

A first consignment of cassava starch has been shipped to England by Messrs. Etherington from their factory in Dominica. Shipments of cassava starch have been recently sent from Jamaica to London, and the results are certainly promising.

The fruit growers of Porto Rico, representing a capital of about $4,000,000, have recently formed a protective association in order to be able to make more favourable terms with the steamship companies for transport of their produce.

The *Gardeners' Chronicle* states that a Norwegian company has bought a large area of land at Toatal near Passacoa in Cuba, with the object of cultivating pine-apples and bananas for the home market. A manager well acquainted with West Indian conditions has been appointed.

Russian egg exporters have adopted the method of shipping their produce without the shells. In this way excessive freight is avoided, as also loss from breakage, etc. These eggs are put up in air-tight boxes, and may be purchased with or without salt; they are sold by weight and appear to be popular on the continent, although they do not seem to suit the English trade (*British National Druggist.*)

Praedial larceny, or the theft of growing crops, has lately been causing a great deal of trouble in Jamaica. A recent number of the *Daily Telegraph* reports the trial of 21 such cases in the police courts. The usual punishment appears to be three months imprisonment. These thefts are particularly hard upon the small peasant proprietor.

The December number of the *Journal* of the Jamaica Agricultural Society comments strongly on the unsanitary conditions under which the milk supply of Kingston is produced. Having regard to the readiness with which disease may be carried through the medium of milk, this is a matter needing immediate attention from the Agricultural Society and others in the island.

The Liverpool press recently published a letter from Mr. Chamberlain to Sir. Alfred Jones, in which the late Secretary of State for the Colonies offers his congratulations on the progress of the cotton industry in Jamaica. Mr. Chamberlain added that he will be interested to learn of the success of the efforts that are being made in Jamaica to encourage cotton growing amongst small landowners.

The raising of Sicilian lemons is under experiment in Porto Rico, where a plantation of 10,000 trees has recently been established. The trees were imported from one of the best lemon-growing districts of Sicily. The specimens so far produced in Porto Rico appear to equal the best grade of Sicilian lemons. These results appear to promise a new industry for the island. (*U.S. Consular Report.*)

A note in the *Louisiana Planter* draws attention to the extraordinary development of the sugar industry in Porto Rico. The value of the sugar imported by the States from Porto Rico was in 1897, no more than $1,500,000. The figure for 1907 is $15,000,000—a ten-fold increase. This also practically indicates that the total output of sugar from the island at present is ten times what it was in 1897.

A note in the *Agricultural News* (Vol. VI, p. 360) mentioned that a shipment of bananas from Trinidad had recently been made to France by the steamer *Guadeloupe.* It has later been reported in the Port-of-Spain *Mirror* that a price of $3 per bunch was realized for the fruit, but that the expenses were high in consequence of the import duty on foreign fruit. The same paper states that 600 more bunches of bananas are being sent by the next mail.

THE BREATHING OF PLANTS.

A reprint of a lecture on the above subject, delivered at the New York Botanic Gardens, appears in a late number of the *Journal of the Botanic Gardens*. The fallacy of the popular idea—taken literally—that plants differ from animals in that while the latter breathe in oxygen and breathe out carbon dioxide, the former absorb carbon dioxide and exhale oxygen, is explained, and it is shown that respiration or the absorption of oxygen, with its consequent exhalation of carbon dioxide is carried on by every part of a living plant—leaves, flowers, stem, and roots. The following extracts are from the lecture in question:—

Great differences exist between certain animals, as well as between certain plants, but the process of respiration is everywhere the same. Even dry seeds, which certain German physiologists have considered as in a condition of '*Scheintodt*' (apparent death), are respiring. The bouquets in our vases, the celery and lettuce on our tables, as well as the trees, shrubs, and herbs, indoors and out, are constantly taking in oxygen, exchanging it in the living cells for carbon dioxide, and returning the latter to the surrounding air.

Even in regard to the amount and rate of respiration the supposed difference between animals and plants breaks down. Under favourable conditions the process may even be more active in plants than in animals. In man the carbon dioxide produced in twenty-four hours equals about 1·2 per cent. of the body weight, but in some of the moulds the amount has been found to equal 6 per cent of the dry weight of the plant. Bulk for bulk, the very active bacteria may consume oxygen 200 times more rapidly than man. In both kingdoms respiration is accompanied by an evolution of heat.

In plants, as in animals, the rate of respiration varies with the age of the organism, and with external conditions. Breathing, which is the expression of respiration in man, is most rapid with infants, and decreases with the approach of old age. So it is with plants, for germinating seeds and young seedlings respire more rapidly than mature plants. Increase of work is accompanied with increase of respiration in animals: in trees also, the process is more vigorous in the spring, during the work of bud opening and putting forth of new leaves and flowers. Under bodily pain or mental excitement we breathe more rapidly, so also does a plant that has been cut, or otherwise injured, or subjected to any stimulus, as, for example, violent shaking. A thermometer placed in a dish of cut onions, for example, will indicate the existence of a fever (due to wounding of the tissue), just as surely as if placed in the mouth of a typhoid patient.

This question is far from having a merely academic interest. Practices that have been in vogue since man first began to till the soil, and that must be continued as long as agriculture is carried on, depend in part upon the respiratory function of plants.

In reference to the operations of ploughing the soil and hoeing the crops, it is not alone to get the soil into a suitable physical condition that this work is carried out by the farmer. The roots and other under-ground parts must have air to respire just as much as the parts above ground, but if the soil is hard and compact this need is but poorly met. The plough, the spade, and the hoe facilitate the thorough aeration of the ground. For the same reason it is desirable frequently to loosen the surface of the soil in the flower pots, and this, in part, is why flower pots are made of porous material.

PREPARATION OF RUBBER FOR MARKET.

In view of the experimental work that is in progress in many of the West Indian Islands in the cultivation of rubber trees, and of the efforts that are being made to place the resulting product on the market in the best form possible, the accompanying extracts from the last *Annual Report* of the Director of Agriculture of the Federated Malay States, (Mr. J. B. Carruthers, F.L.S.) are worthy of note:—

Our knowledge of the best methods of preparation of plantation rubber for the market is still in the plastic and changeable stage. Biscuits have had their day, and on all estates producing any quantity of rubber they have been abandoned as unpracticable when large quantities are to be treated. Sheet or crêpe have both their advantages, and the manufacturer has learnt to appreciate their fine qualities. But the goal to which the rubber planter is making in relation to the improvement of his product is the preparation of a rubber which the buyer and manufacturer will consider as good as, or better than, the finest Brazilian Para.

The qualities of resilience, elasticity, and durability which characterize the Brazilian rubber must be produced in plantation rubber, and the discovery of the means by which this end can be obtained has been the subject of much consideration, experiment, and observation both in the Malay States and in Ceylon.

Acetic acid and creosote, which, in the case of the preparation of Brazilian rubber, are added by submitting the latex to smoke containing these substances, have been introduced in the case of plantation rubber by mixing small quantities of these two substances in solution.

The acetic acid produces quick coagulation, and the creosote is an efficient antiseptic and prevents the growth of bacteria which produce 'tackiness' or other putrefaction of the dry rubber.

The physical treatment of the Brazilian Para, which is sent home in blocks consisting of a series of thin films of rubber, each dried so that it contracts and produces an automatic pressure, is most probably one of the factors which give it its resilience and elasticity. This has been imitated by artificial pressure, by means of a screw press, of the rubber into blocks of approximately the same density as the Brazilian Para. The presence of a certain percentage of water in the Brazilian block may be one of the factors which add to its good qualities, and the retention of a percentage of water, instead of the complete drying which had previously been carried out in the Federated Malay States rubber, has now been tried with success. Wet block rubber sent home from Malay and Ceylon was received with satisfaction by the buyer, and fetched a higher price than any other plantation rubber on the same day.

The manufacture of wet block rubber, i.e., rubber which after being coagulated and asepticised is at once pressed into blocks, is a great saving of time, and in the space of plant required. Rubber can be prepared for shipment a few hours after the latex has been taken from the tree.

The block rubber travels better without the deterioration *en route* to which the other forms, having large exposed surfaces are very liable.

The production of wet block rubber, free from putrefaction, of a convenient size and weight, and containing a uniform quantity of water, say 10 per cent., seems at present without doubt the best method.

GEOLOGY AND MINERAL RESOURCES OF TRINIDAD.

Dr. R. W. Ells, LL.D., etc., read a paper in May last before the Royal Society of Canada on the Geology and Mineral Resources of Trinidad and Barbados. The extracts given below relate to the island of Trinidad, and in the next issue of the *Agricultural News* it is proposed to reprint parts of Dr. Ells' paper dealing with Barbados :—

The geology of both Trinidad and Barbados is quite simple. In Trinidad, the northern portion from the passage separating the north-west corner from Venezuela, known as the Bocas, to the cape at the north-east extremity, is occupied by a range of hills with elevations rising in places to more than 3,000 feet, composed of slaty and schistosex rocks with occasional areas of limestone. The schist is cut by veins of quartz generally of small size in which traces of gold are found, while the presence of iron has also been recognized at several points. These schists are the oldest rocks in the island, and resemble the lower Cambrian of Canada in many respects.

The mines of manjak located near San Fernando are also exceedingly interesting. The mineral is also an altered petroleum, and now occurs in fissures which traverse the shales and sandstone of the oil-bearing series in the same way as the albertite mines in New Brunswick have been formed. Their position is near the crest of an anticline and the fissures have been formed in the period of disturbance or crushing by which the anticlinal folds were produced.

The mineral manjak is a very pure variety of asphalt carrying from 90 to 95 per cent. of bitumen. A certain amount of impurity is found in the form of clay particles evidently detached from the sides of the fissures in the process of vein formation. It is jet black, glossy, and brittle, and can be lighted in the flame of a match, dropping like sealing wax and taking readily the impression of a seal. In this respect it differs somewhat from New Brunswick albertite, which does not fuse readily but splinters on the application of heat. Manjak is largely used in the manufacture of high grade black varnishes, insulating paints for electric conductors, waterproof paints, etc. The veins vary greatly in size, the principal one worked having increased from a width of about 7 feet at the surface to over 30 feet at a depth of 200 feet. Much of the mineral in the upper 100 feet is what is known as columnar, as if the vein matter had been shattered by pressure, but at lower depths the massive form comes in and forms the greater portion of the deposit. In its conchoidal fracture it resembles strongly the albertite of New Brunswick, as also in general aspect, the difference (apparently due to metamorphism on the part of the latter) being that the albertite occurs in Devonian rocks while the manjak is found, both in Trinidad and Barbados, in the soft Tertiary clays, and is comparatively unaltered from its pitch condition, in this respect presenting analogies to anthracite and lignite in the coal series. The limit of the veins in depth has not been ascertained at any one point, with one exception in Barbados, where, in a shaft at a depth of 150 feet, the manjak became soft and soon passed into a thick, asphaltic oil which could be removed by bailing. The Barbados mineral is somewhat purer and apparently softer than that of Trinidad and commands a higher price in the market, some portions of the output realizing as much as $75 to $90 per ton in the English market. It will be seen therefore that this mineral has a high economic value, and with the increase in the demand should form a very important article of commerce. The albertite of New Brunswick, of which some 250,000 tons were mined before the vein matter was exhausted, was used largely for mixing with ordinary bituminous coal in the manufacture of gas, possessing the property of keeping the production at a high standard.

It can be readily seen therefore, that the island of Trinidad possesses great resources in the matter of asphalt, manjak, and petroleum, which are now coming into prominence, and will undoubtedly in a few years become a great source of wealth to the investors, and of revenue to the Government, since the development work already done is most encouraging

EXPORTS FROM SAMOA.

The United States Consul at Apia gives, in his latest *Report*, the following particulars relating to the agricultural exports of Samoa :—

The exports of agricultural products from Samoa amounted to $720,258, against $482,835 in 1905.

Copra exports for 1906, show an increase of $217,011 over the previous year. In value, copra constituted 96 per cent. (about $687,939) of the total exports, Germany taking 50 per cent., other European countries 26 per cent., and Australasia 24 per cent. There has been a steady increase in the production of copra, as since 1900, no less than 333,000 cocoa-nut trees have been planted by the natives the government having made it compulsory for every village to plant fifty cocoa-nuts each year.

The exports of cacao amounted to $16,943, as against $7,200 in 1905, Germany taking the most of it.

ARBOR DAY AND TREE PLANTING.

At a Convention, held in June last, of the Chamber of Agriculture, Victoria, Mr. J. M. Reed, Surveyor-General, read a paper entitled, 'The Importance of Tree planting.' Mr. Reed referred to the danger which exists in agricultural countries of too rapid exploitation of the timber resources, and pointed out that the reasonable aim should be to do all that was possible to conserve existing woodlands and to promote tree planting, consistently with the increasing demand for land for agricultural purposes.

Speaking of Arbor Day, and the good work done as the result of this movement, Mr. Reed said :—

A leading institution, now familiarly known as Arbor Day, is becoming more and more popular with members of our State, Shire and Borough Councils, acting in conjunction with the Education Department in a most praiseworthy manner to promote the success of the movement. If all the gentlemen present at this Convention would take an active interest in this work and encourage the young people to become planters, the good effect throughout the State would be speedily evidenced.

Arbor Day was originated in America, in 1872, by the Nebraska State Board of Agriculture, at the instance of Mr. J. Sterling Morton, and from its inception has been remarkably successful. Throughout the United States, Arbor Day is now systematically observed, and through the active co-operation of the schools, colleges, and universities, a great interest in tree planting has been fostered and a wonderful success achieved. In many States Arbor Day is a recognized public holiday. It has been officially recorded that the inauguration of this movement by Mr. Morton has done more for the protection of forests, and the encouragement of tree planting, than all the legislation that has been enacted in connexion with this question.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following reports on the London drug and spice market during the month of November :—

The spice and drug markets during the month of November have experienced a very variable course, many things occurring to alter or impede the usual order of business. Of these causes may be mentioned the high and fluctuating Bank rate, and the American crisis.

GINGER.

In the matter of ginger, at the first spice auction on the 6th, only 1 barrel of Jamaica was offered and sold at 70*s.* per cwt.; 900 packages of Cochin and Calicut were also offered and bought in at prices varying from 37*s.* to 95*s.*, according to quality. A week later, 105 packages of Jamaica, and 135 bags of wormy rough Cochin were offered and all bought in, the latter at 35*s.* 6*d.* On the 20th, 10 bags of washed Jamaica sold at 70*s.* to 72*s.*, and good common at 67*s.* At the last sale on the 27th, 156 packages of Jamaica were offered and only 6 sold at 53*s.* for bold dark, 73*s.* to 76*s.* being the prices at which ordinary to good ordinary was bought in.

NUTMEGS, MACE, AND PIMENTO.

Of the first named, on November 13, 10 cases of Penang were disposed of without reserve, at the following rates:—69's, at 1*s.* 2*d.* to 1*s.* 3*d.*; 83's, at 7*d.* to 7½*d.* Forty-seven boxes of Singapore were also sold, 80's, at 7*d.* to 7½*d.* Fourteen cases of Ceylon 98's, wormy, fetched 4*d.* to 4½*d.*, and 24 packages of West India were offered and sold as follows slightly wormy, 71's, at 5½*d.*: fair, 82's, at 6½*d.*; 84's, at 6*d.*; and 95's, at 5½*d.* per lb. Similar prices prevailed during the remainder of the month, with a slightly lower tendency in West Indian. On the 13th, 10 packages of West Indian mace were disposed of at 1*s.* 3*d.* to 1*s.* 4*d.* for fair: 1*s.* 1*d.* to 1*s.* 2*d.* for ordinary; and 9*d.* for broken. Fair Penang realized 1*s.* 5*d.*, and wild Macassar was bought in at 10*d.* On the 27th, there was but very little alteration; 3 packages of fair West Indian realized 1*s.* 2*d.* to 1*s.* 3*d.* and Ceylon broken and pickings 9*d.* to 11*d.* per lb. Of Pimento there has been but very little demand during the month. At the first sale when about 100 bags were offered, all were bought in at 3¼*d.* A fortnight later, the quotations were $3\frac{1}{16}$*d.* to 3⅛*d.* for fair, at which price the whole offerings were bought in, and no further change occurred during the remainder of the month.

ARROWROOT.

At the spice sale on the 6th, 309 barrels of St. Vincent were offered and bought in at 2⅜*d.* to 2⅝*d.* for fair to good manufacturing. On the 20th, a few cases of good Natal were offered and realized 4*d.* per lb.

SARSAPARILLA.

At the first drug sale in the month, grey Jamaica had advanced 2*d.* to 3*d.* over previous rates. Native Jamaica sold at steady rates, 2 bales of fair red realizing 1*s.* per lb., and 2 bales of dull red 11*d.* per lb. Five bales of a kind said to be from Ecuador, but imported via New York, and resembling a starchy kind of Guayaquil, sold at 9*d.* per lb. At the auction of the 21st, 11 bales of grey Jamaica were offered, 9 of which were sold—for good fibrous, 1*s.* 9*d.*; and for slightly coarse and country damaged, 1*s.* 7*d.* to 1*s.* 8*d.* per lb. Twenty-one bales of Lima-Jamaica were offered and 12 sold at 1*s.* 7*d.* for fair, and 1*s.* 4*d.* to 1*s.* 5*d.* for rather coarse. One bale of good red native Jamaica realized 1*s.* per lb., and 20 bales of a character similar to Guayaquil were bought in at 1*s.* 1*d.* per lb. A recent outcry about the false packing of sarsaparilla, deserves all the publicity that can be given to it, with the view of exposing and preventing such a nefarious practice. The *Chemist and Druggist* of November 9, referring to this, says: 'Of late several parcels of Native Jamaica sarsaparilla have been consigned to London mixed with red earthy dust and clumps, and occasionally stones have been found packed in the interior of the bales. A parcel offered at the drug auction to-day prove to have been false packed with several pounds of this rubbish—a practice which, if continued, is likely to detract from the value of the goods and weaken confidence in the article.

KOLA, LIME JUICE, QUILLAIA, etc.

At the auction on the 6th, 7 packages of fair dried West Indian kola sold at 2*d.* to 2½*d.* per lb. A fortnight later, the offerings from all sources amounted to 37 packages, fair Ceylon and West Indian selling at 2*d.* to 2½*d.*, 1 bag of very mouldy West Indian finding a purchaser at 1¾*d.* per lb. On the 27th, some 50 bags of West Indian dried were all bought in at 3½*d.* per lb. Of lime juice at the first sale 34 packages were offered and 21 sold, fair raw West Indian fetching 1*s.* 2*d.* per gallon. Oil of lime was represented at the first auction by 20 packages of West Indian distilled, the bulk of which was held at 2*s.* 3*d.* per lb. No other sales occurred during the month. On the 6th., one case of West Indian Oil of bay realized 7*s.* 3*d.* per lb. Some 22 bags of fair dry Ceylon annatto seeds were offered, and sold at the first auction, at from 2*d.* to 2¼*d.* per lb. No other sales were made during the remainder of the month. Quillaia bark has commanded higher prices, 30*s.* per cwt. being asked and 35*s.* for crushed. A large consignment of cashew nuts from Bombay was offered during the month, good white decorticated finding purchasers at 47*s.* 6*d.* per cwt. and fair at 44*s.*

STOCK REARING IN JAMAICA.

The American Consul at Kingston contributes the following note on the rearing of animals in Jamaica to the December number of the *U.S. Consular and Trade Reports*:—

The rearing of cattle, horses, and mules is an important industry in Jamaica. This is known as 'pen keeping,' the pens varying in size from 200 to 2,000 acres, and embraces for a pen of 1,000 acres about 350 to 400 head of cattle. Cattle raising is most largely engaged in by the pen keepers, who rear both beef and draft animals. The English breeds are for the former, and the East Indian cross breeds for the latter purposes. Dairying is not carried on to any great extent, the native cow not being a good milker. Jamaica must therefore draw largely from foreign sources for butter, cheese, and condensed milk supplies.

Excellent horses are bred on the island, both racing and work stock. Horse and mule breeding is a profitable industry for the pen keeper having proper knowledge of its requirements. All heavy draft work is done by mules, for which animals a large home market is created, owing to the fruit and dyewood industries. For the fiscal year 1906 the export statistics of animals are given as follows: Cattle, 2,769 head, valued at $80,673; horses and mules, 273 head, valued at $16,517. Hides to the value of $41,852, and goat skins to the value of $47,292 were also exported. Cuba afforded the principal market for cattle. Bee keeping resulted in export returns of honey amounting to $49,560 for the same year.

MARKET REPORTS.

London,— January 7, 1908, 'The West India Committee Circular;' Messrs. Kearton, Piper & Co.; January 7, 1908, Messrs. E. A. de Pass & Co.; 'The Liverpool Cotton Association Weekly Circular,' January 3, 1908.

Arrowroot—St. Vincent, 2½*d.* per lb.
Balata—Sheet, 2/4; block, 1/7 per lb.
Bees'-wax—£7 15*s.* per cwt.
Cacao—Trinidad, 114/- per cwt.; Grenada, 92/- to 99/- per cwt.
Coffee—Santos, 30/4½ per cwt.
Copra—West Indian, £20 per ton.
Cotton—18*d.* to 20*d.* per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—No quotation per box.
  Pine-apples—St. Michael, 1/2 to 3/6 each.
  Grape Fruit—5/- to 7/6 per box.
  Oranges—Jamaica, 5/- to 7/- per box.
Fustic—£4 5*s.* to £4 15*s.* per ton.
Honey—16*s.* to 28*s.* per cwt.
Isinglass—West India lump, 2/- to 2/2 per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/3 per gallon; concentrated, £18 17*s.* to £19 per cask of 108 gallons; Distilled Oil, 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£4 5*s.* to £4 15*s.* per ton; Roots, no quotations.
Mace—Fair, 1*s.* to 1*s.* 3*d.*; pale, 1*s.* 4*d.*; broken, 10*d.* to 1*s.*; ordinary, 1*s.* to 1*s.* 1*d.* per lb.
Nutmegs—75's, 8*d.*; 77's 6*d.*; 92's to 103's, 5½*d.* to 6½*d.*; 112's to 134's, 4½*d.*
Pimento—Market quiet, 3*d.* to 3¼*d.* per lb.
Rubber—Fine hard Para, 4*s* 3¼*d.* to 4*s.* 4½*d.*; fine soft, 4*s.* 2½*d.* to 4*s.* 3½*d.* per lb.
Rum—Jamaica, common, 2*s.* 9*d.* to 2*s.* 10*d.*; good, 3*s.* to 8*s.*; Demerara, 1*s.* 2*d.* to 1*s.* 3½*d.*; Trinidad, no quotations.
Sugar—Crystals, 17/3 to 19/3 per cwt.; Muscovado, no quotations; Molasses, 12/9 to 15/1½.

New York,—January 10, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 21c. to 23c.; Grenada, 20c. to 21c.; Trinidad, 20c. to 22¾c.; Jamaica, 16½c. per lb.
Cocoa-nuts—Jamaica, select, $24·00 to $26·00; culls, $14·00 to $15·00; Trinidad, $18·00 to $20·00; culls, $12·00 to $13·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c.; washed fancy, 9½c. to 11½c per lb.
Ginger—Small to lean scraggy root, 8½c. to 9¼c. per lb; bold root, 9¼c. to 9¾c.; small to bright bold, 10½c. to 11c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitts, 30c. to 43c.
Grape Fruit—Jamaicas, no quotations per barrel, $1·00 per box
Limes—No quotations.
Mace—28c. to 32c. per lb.
Nutmegs—110's, 9½c. to 10¾c. per lb.
Oranges—Jamaica, no quotations per barrel, no quotations per box.
Pimento—No quotations.
Sugar—Centrifugals, 96°, $3·15 to $3·16; Muscovados, 89°, $3·07 to $3·16; Molasses, 89°, $3·03 to $3·16 per lb, duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., January 21, 1908; Messrs. T. S. Garraway & Co., January 20, 1908; Messrs. Leacock & Co., January 11, 1908.

Arrowroot—St. Vincent, $4·25 to $4·50 per 100 lb.
Cacao—Dominica, $16·00 per 100 lb.
Cocoa-nuts—$11·00 per M. for husked nuts.
Coffee—Jamaica, $8·25 to $10·50 per 100 lb.
Hay—$1·85 to $2·00 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Onions—Madeira, $1·50 to $2·50 per 100 lb.
Potatos, English—$1·50 to $2·10 per 160 lb.
Peas—Split, $6·00 to $6·50; Canada, $3·45 to $3·50 per bag.
Rice—Demerara, $5·25 (177 to 180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana.—January 11, 1908.—Messrs. Wieting & Richter; Messrs. Sandbach, Parker & Co.

Arrowroot—St. Vincent, $10·50 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 20c. to 21c. per lb.
Cassava—No stock.
Cassava Starch—$9·60 per barrel.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$4·80 to $5·00 per bag of 168 lb.
Eddos—$2·40 to $2·64 per barrel.
Molasses—Yellow, 18½c.; Dark, no quotations per gallon.
Onions—Madeira, 3c. to 3½c; Lisbon, 3c. to 3½c. per lb.
Plantains—20c. to 64c. per bunch.
Potatos,—Madeira, $2·80 to $3·00 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $4·50 to $4·60 per bag; Seeta, $6·00 per bag.
Rubber—No quotations
Split Peas—$4·00 to $7·25 per bag (210 lb.).
Tannias—$3·60 per bag.
Yams—White, $3·00; Buck, $4·00 per bag.
Sugar—Dark crystals, $2·20 to $2·40; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·50 per M.
——— Firewood—$2·40 to $2·64 per ton (3-feet lengths).

Trinidad,—January 11, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$18·50 to $19·50 per fanega; Venezuelan, $18·00 to $20·00 per fanega.
Cocoa-nuts—No quotation.
Cocoa-nut Oil—75c. per Imperial gallon.
Coffee—Venezuelan, 7c. to 8c. per lb.
Copra—$2·75 to $3·00 per 100 lb.
Dhal—$4·25 to $4·40 per 2-bushel bag.
Onions—$2·25 to $2·50 per 100 lb. (retail).
Potatos, English—$1·60 to $1·75 per 100 lb.
Rice—Yellow, $5·50 to $5·60; White, $5·50 to $6·00 per bag.
Split Peas—$3·30 to $6·25 per bag.
Sugar—$5·00 to $5·10 per 100 lb.

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Agricultural Education in the West Indies.

THE report presented by the special committee appointed to deal with this question at the recent Agricultural Conference indicated that considerable advance has been made in agricultural education in the West Indies and British Guiana during the past nine years.

As regards elementary schools, in practically every colony steps have been taken to provide a course of training for teachers, in the principles underlying agricultural practice in order to fit them to give suitable instruction to their pupils. In this connexion, too, the provision and use of school gardens have been general, and on the whole, the progress made has been fairly satisfactory.

In many of the secondary schools of the West Indies, systematic efforts are being made to bring scientific agricultural instruction within the reach of boys who hope to become planters, or managers of plantations. This is especially the case at Harrison College, Barbados. Other centres of instruction in the sciences allied to, and bearing upon agriculture, are the Jamaica College, the Government Laboratory, Trinidad, the Queen's College, British Guiana, and the Grammar Schools at Antigua and St. Kitt's.

At the agricultural schools established by the Imperial Department of Agriculture at Dominica, St. Lucia, and St. Vincent, a course of instruction extending over three years, together with free board and lodging, is given to selected boys, with the object of preparing them for a life of responsible agricultural work.

These facts were laid before the Conference in Reports from the Education Section presented at the recent Agricultural Conference by his Lordship the Bishop and the Revd. Dr. Dalton (Head-master of Harrison College, Barbados). The latter followed up the presentation of his report by an address, in which he drew attention to the great importance of further effort being made to extend agricultural teaching in secondary schools in all these colonies. Reference was also made to the question of the establishment of a University for the West Indies, in which Tropical Agriculture should be a branch of instruction receiving special attention.

Following Dr. Dalton, an interesting and important point was raised by the Hon. Francis Watts, who brought forward a suggestion that something might be done, through the Imperial Department of Agriculture, to organize a system of reading on subjects connected with their work for overseers and sub-managers of estates, to be followed by examination for certificates of proficiency.

The first step towards the establishment of such a system would be to draw up and arrange courses of reading suitable for young men anxious to extend their knowledge of matters relating to tropical agriculture, including soils and crops, and the management of estates. These courses would have special reference to the methods of cultivation of local crops.

The examinations, it was suggested, should be held at regular intervals, and in order to get more thorough results and to avoid cramming, it was proposed that candidates should, at one time, be examined only in a single branch of knowledge, such as the methods of cultivation, etc., of a particular crop. For example, a man might, in the first place, submit himself for examination in the details of sugar planting and manufacture. Later, he could take up the details of cotton cultivation. An overseer living in an island like Dominica, St. Lucia, or Trinidad, would probably offer as subjects of examination, the principles and practice of cacao, fruit, and lime growing. The examinations should be broad and general in their scope, but certificates would only be awarded as the result of real proficiency, and not on the basis of mere book work or a smattering of knowledge.

To make the certificates more valuable, and in order that the holder might be recognized as a man well qualified, both from a practical and theoretical point of view, it was pointed out that it would not be advisable to admit an overseer to examination who had not been engaged in the actual practice of his work for at least one year. The object would be, that a man who held a certificate of proficiency in regard to sugar, cotton, or cacao cultivation might be relied upon as being thoroughly qualified in connexion with the crops specified, by those who wished to engage him.

Apart from the subjects included in the reading course, the examination should include practical subjects, such as details of cultivation and management, a knowledge of which could only be acquired by work on an estate, and as much importance would be attached to correct methods of handling a plough in the cane or cotton fields as to a knowledge of elementary chemistry or botany. Further, in regard to the same idea, there should be a practical planter on the Examination Board, who could test by oral examination a candidate's knowledge of field work and estate management.

In conclusion Dr. Watts stated his conviction that if such a system were established, young men holding certificates would be much more likely to obtain remunerative employment than under present conditions, while their powers of usefulness would be considerably enhanced.

It was suggested that the subject should be brought up for discussion at the Agricultural Societies, and that planters and overseers generally be made acquainted with the proposals. Although the idea may be new in the West Indies, yet in Great Britain the Board of Agriculture and the Royal Agricultural Society have co-operated for some years in holding examinations for what is known as the National Diploma in Agriculture. Each examination is held in two parts, with an interval of a year between the two, and is of a thoroughly practical nature, suitable for farm managers, etc. In the United States, also, the institution of 'Farmers' Reading Courses,' with or without following examinations, has for years been part of the educational work of the Department of Agriculture.

The proposals in regard to what was suggested should be done were brought before the Barbados Agricultural Society on Friday, January 24, by Sir Daniel Morris, who went over the points outlined above, and suggested that a special meeting of the Agricultural Society be held for the purpose of considering whether something of the kind could not be started on simple lines at Barbados and elsewhere. The Imperial Commissioner pointed out that the agricultural industries of the West Indies would reap considerable benefit from increased scientific knowledge on the part of overseers and managers, and further, that the possession of certificates of competency might also be a means of helping some of the young men of the island to lucrative posts in other colonies. There was need and room for good men, and courses of instruction such as those described would be one means towards producing them and advancing their interests, as well as those of the colonies in which they laboured.

SUGAR INDUSTRY.

Sugar-cane Experiments at Barbados.

At a special meeting of the Barbados Agricultural Society, held on January 11 last, Professor d'Albuquerque and Mr. J. R. Bovell presented a summary of the more important and interesting results obtained in connexion with the sugar-cane seedling and manurial experiments, carried on in Barbados under the direction of the Imperial Department of Agriculture, during the crop season of 1905-7.

The work of raising new varieties of seedling canes has now been in progress for many years, and during the time no less than 30,000 new varieties have been produced and tested. The great majority of these have shown no particular merit; some, which have shown exceptional qualities, are already being planted extensively by estate proprietors, while a large number of varieties are still at various stages of the testing process as regards their field characters and yield and purity of juice.

Selected varieties of seedling canes were, during the past year, grown on eleven black soil estates, and three red-soil estates, and Professor d'Albuquerque referred to the willingness of planters to allow the use of their land in testing the varieties, as a result of which it has been possible to carry out trials in every typical soil, and under every climatic condition existing in Barbados.

The weather conditions during the season under review were rather unfavourable, and in many instances the average weight of canes obtained per acre was small, especially among ratoon canes.

Eight selected varieties of seedlings were, during the season 1905-7, grown in comparison with the White Transparent cane on black soils in the island. Three of these seedlings were especially noticeable on account of the good return yielded by them. Cane B. 3,696, which headed the list on black soils, gave 2,045 lb. of saccharose in excess of that given by the White Transparent, this representing an increased value of $29·61 per acre: B. 208 came second with an increase of 1,494 lb. of saccharose, and an increased value of $21·63 over and above the return obtained from the standard cane. Cane B. 147, which took third place, showed an increased value of $13·34 per acre.

On red-soil estates, during the season under review, ten selected varieties were grown in comparison with the White Transparent. Five of these were grown as plants only, and five both as plants and ratoons. As plant canes, all gave returns in advance of the yield obtained from the White Transparent, which gave 6,006 lb. of saccharose per acre. Cane B. 3,405 headed the list with a yield of 10,792 lb. of saccharose per acre, while B. 3,412 and B. 3,390 came second and third with 9,589 lb. and 9,536 lb. of saccharose respectively.

Considering now the five varieties grown both as plants and ratoons on red soils during 1905-7, cane B. 1,566 was again, as last year, top of the list, giving 8,394 lb. of saccharose per acre as plants, and 6,645 lb. as ratoons, as against 6,006 lb. per acre from the White Transparent as plants and 5,736 lb. as ratoons, showing a total gain of $47·73 per acre. D. 95 and B. 376 came second and third respectively, on the average of both plants and ratoons, the former showing a yield of 6,266 lb. of saccharose as plants and 7,591 lb. as ratoons, and the latter giving 6,123 lb. as plants and 6,586 lb. as ratoons. The other canes which gave good results were: B.3,635, D.95, B.1,753, B.376, and B.1,529 on black soils, and B.208 on red soils.

It will be noted that in regard to the purity of juice, all the above varieties were fair to good, an important point in muscovado manufacture.

In the 1905-7 crop, too, some trials of seedling canes in comparison with the White Transparent were made in different parts of the island, on larger estate plots of from ½ acre to an acre in extent. At Jordan's plantation (St. George), B. 208 gave 2,180 lb. of saccharose per acre in excess of the yield obtained from the White Transparent, while at Husbands (St. Lucy), B.147 and B.208 each gave 1,340 lb. sugar per acre more than the standard variety.

Considering now the average results obtained with the best varieties during the past four seasons, it is seen that B. 3,696 still keeps its position as first on the list of plant canes on black soils. As regards the other varieties, however, there is a slight re-arrangement from the positions gained on the basis of the 1905-7 crop alone. Still considering plant canes only, on black soils, B. 1,753, B. 1,529, and B. 147 came second, third, and fourth respectively, the increases per acre, compared with the White Transparent, being valued at $31·71, $16·18, and $11·64. Considering the returns obtained, over the past four years, as plants and ratoons taken together, on black soils, B. 208 gave an average of 5,512 lb. of saccharose per acre, as against 5,197 lb. from the standard variety.

Among all the promising varieties grown on black soils, and considering the results obtained with plant canes only, the White Transparent comes out ninetieth, on the average of the past three and four years, with a yield of 6,670 lb. of saccharose per acre. There are no less than seven varieties, however, that have been cultivated for three or four years, which, on the average of the period, gave yields of from 9,004 to 10,120 lb. of saccharose per acre. Among these, B. 6,201, B. 3,675, B. 3,747, and B 3,696 may be specially mentioned.

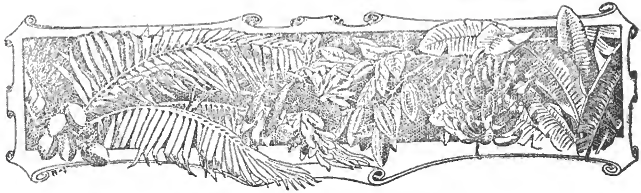
Considering the average returns obtained on red soils during the past four years, striking results are recorded. Among plant canes, B 3,405 gets first place on the average of the crops of 1904-6, as in the crop of 1907 considered alone. The increased value of the yield of B. 3,405, as compared with that of White Transparent, was $59·17. As plant canes, too, B. 3,412 and B. 3,390 did remarkably well, giving values of $55·75 and $49·87 respectively, in excess of the White Transparent return. B. 1,566 and B. 208 also did well. Taking plants and ratoons together, on red soils, for the same period, B. 376, D. 95, and B. 208 gave increased values per acre, as compared with the White Transparent, of $10·84, $10·59, and $8·13 respectively.

New seedling canes to the number of 4,874 were planted in 1905. From these, after the usual testing processes, 118 were selected, and were replanted at the close of 1907.

At the end of 1906, owing to the unfavourable weather conditions, only 219 seedlings were obtained. These were transplanted in due course, and will be tested during the reaping season of 1908, and all the stools of the best varieties will be replanted.

The work of producing seedling canes by artificial hybridization, crossing parent canes of known merit for this purpose, is being conducted by Mr. F. A. Stockdale, B.A., F.L.S., and it is anticipated that future work in this direction will lead to valuable and interesting results.

The results of the manurial experiments carried on during the past year were also put before the meeting. These experiments were conducted at Dodds Botanic Station, and at five sugar estates situated in typical parts of the island.



WEST INDIAN FRUIT.

PROFITABLE VARIETIES OF PINE-APPLES.

The *Cuba Review* for December last gives the following particulars as to varieties of pine-apples most worthy of attention:—

The Red Spanish is the only variety that it is profitable to grow on a commercial scale at the present time. It is a very strong, hardy, and vigorous variety. The fruit is small to medium, weighing from 2 to 8 lb. The flesh is pale yellowish-white, solid and juicy. The flavour, however, is poor, being very acid unless ripened on the plant. For home use the Red Spanish is not to be compared with some other varieties, but it will stand the rough handling that at present seems to be considered as part of the pine-apple business.

The Golden Queen pine-apple is an early variety and is described as a fruit the plants of which do well upon high lands, but will not stand wet soils. The fruits weigh from 2 to 6 lb., and are of a handsome, golden-yellow colour. The flesh is solid and the flavour delicate. Golden Queen is not a long keeper, but an excellent variety for home use.

The Smooth Cayenne and Sugar Loaf varieties are also recommended as producers for the home market. The former produces a large, handsome fruit with an excellent flavour. Unfortunately, however, it does not possess keeping qualities, which render it unsuitable for the export trade. The Sugar Loaf pine-apple is a late variety which will do well on poor land and is also able to stand drought. The variety is productive, the fruit has good flavour, but this also does not keep well.

CITRUS FRUITS AND PINE-APPLES IN PORTO RICO.

Owing largely to American initiative and the favourable market offered by the United States, the growing of oranges and pine-apples gives good returns in Porto Rico. With better facilities for transport, too, the industries will in all probability undergo still further development. The American *Consular and Trade Reports* for December last contain the following particulars:—

Until the American occupation of Porto Rico there were practically no shipments of oranges to the United States. The natives possessed no knowledge of proper packing methods, and the duty was prohibitive. After the American occupation, the duty was reduced, which gave the industry an impetus and led a few American packers to commence shipping to the United States. Previously no citrus fruits were cultivated in the island, while at the present time it is estimated that about 7,000 acres are under cultivation, principally on the northern coast between San Juan and Arecibo. The stocks are Floridian and California, and the plantations are owned and managed exclusively by Americans. The principal yield, however, is from the native or wild orange trees, neither cultivated nor fertilized, which grow in the mountain regions, on the west coast in the Mayaguez and Aguadilla districts, and on the south coast in the Ponce district. With few exceptions, there are no regular orange plantations in the Mayaguez or Ponce districts, the large number of trees being found on the coffee plantations, where they were planted to give shade to the coffee trees.

These so-called wild oranges, like all tropical fruits, must be handled with the utmost care in order to reach the United States in good condition. This has been accomplished during the last two years owing to the improved methods which the packers have adopted in the picking, transporting, and packing of the fruit. The season begins in September and lasts until about the middle of April. The Porto Rico orange is very sweet and of fine flavour, and the exportation of them has annually increased since the opening of the industry, amounting at present to 250,000 boxes a year.

Pine-apple culture is increasing in the island, this fruit having been extensively planted during the past two years. The largest plantations are on the north coast, though a great many pine-apples are raised in the Mayaguez district. The variety most suitable for shipment in a green state, packed in crates, is the Red Spanish, which originated in Cuba. This is the only variety which can be depended upon to arrive in the United States in good condition. There are now several canning factories on both the northern and western coasts, which are buying up all those varieties and grades which will not bear shipment in their original condition. This industry has been a very paying one to the planters for the past year, and promises to assume larger proportions. One planter has recently set out a plantation comprising 600 acres. I am informed that there are many fruit growers who two years ago paid $50 an acre for land which was at once planted with pine-apples, and the returns for the first crop year show a profit of over 100 per cent., with the land still in their possession and a growing crop for the next season. This has stimulated fruit growing to a remarkable extent. Labourers' wages on the pine-apple plantations have increased with the development of the industry, and the man who formerly demanded a 40c. daily wage now receives 55 or 60c. for his day's labour.

DOMINICA PLANTERS' ASSOCIATION.

The annual general meeting of the Dominica Planters' Association was held on December 30, Hon. A. D. Lockhart, M.L.C., presiding.

The following gentlemen were elected to form the Committee for the ensuing year: Hons. J. C. Macintyre, M.L.C., H. A Frampton, M.L.C., Messrs. W. D. Riviere, L. L. Bell, E. A. Agar, and A. St. Hilaire.

Mr. G. C. Downing was re-elected Honorary Secretary and Treasurer.

The meeting, in acknowledging the receipt of the publications of the Imperial Department of Agriculture, passed a hearty vote of thanks to Sir Daniel Morris for the compliment paid them.

Messrs. E. A. Agar and L. L. Bell were elected to represent the Association at the West Indian Agricultural Conference of 1908.

ONION CROP IN ANTIGUA, 1907-8.

The following report on the present season's onion crop in Antigua has been received from Mr. Thomas Jackson, Curator of the Botanic Station in the island:—

In Antigua, onions are grown as a catch crop, previous to the planting of the sugar-cane. This year the area planted is about 52 acres. The crop is not one which is grown by many planters. Of the 52 acres growing in Antigua at the present time, 40 acres are planted by the Hon. F. Holborrow, and 8 acres are planted on North Sound estate.

The greater part of the seed for this crop was imported from Teneriffe, through the Imperial Department of Agriculture, and sold to planters at the price of cost and charges. The germination of the seed was good, and no trouble has been experienced in transplanting the young onions from the nursery to the field. With the exception of a slight attack of caterpillars, which did no material damage, the crop has not suffered from any insect attack.

TOBACCO PRODUCTION IN TRINIDAD.

In the report for 1906-7 on the Ward Unions of Trinidad, the Warden of Oropuche and La Brea makes the following reference to tobacco growing in his district:—

The peasant proprietors of Oropuche and Siparia seem to have almost given up the cultivation of the fragrant weed, which is to be regretted, as Siparia tobacco once ranked next to the best Havana. In spite of efforts to induce the planters to grow and cure the leaf according to scientific and approved methods, they still adhere to their primitive ways with the usual disheartening results.

It is estimated that in this Ward only 60 acres were in cultivation with tobacco during 1906-7.

In the Report of the Curator of the Royal Botanic Gardens for 1906-7, mention is made of a method of cultivation and a process of curing tobacco, successfully carried out at the St. Clair Experiment Station. It would be of benefit to the tobacco planters of this Ward Union if the Agricultural Instructors could impart this method to them, in order that a once profitable industry might be revived.

Permits for the removal by water of 7,362 lb. of native grown tobacco were issued by the Warden during the year, but as considerable quantities are now removed by land, for which mode of transit no permit is needed, this quantity does not represent the total output.

SUPERPHOSPHATE.

The method of manufacture, and the qualities and uses of this well-known phosphatic manure are discussed at considerable length in the *Journal* of the British Agricultural Organization Society for December last. The subject is treated primarily from the point of view of the British farmer, but the accompanying extracts are worthy of note by agriculturists in all parts of the world who may have occasion to use superphosphate:—

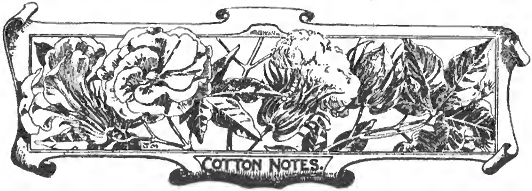
In the purchase of superphosphate, it is sometimes necessary, from a practical point of view, to take the physical condition of the manure into consideration: that is to say, a good superphosphate should be a fairly dry, friable powder, and should not readily become wet and sticky. Unfortunately, this tendency to stickiness is more common in the high grades than in the low, and it arises from the fact that in their anxiety to dissolve as much of the phosphate as possible, the manufacturers use rather more acid in proportion than they do for the lower grades. A sticky superphosphate is exceedingly disagreeable to handle and difficult to distribute evenly, so that it is worth while to remember that any wetness or stickiness can be most easily corrected by thoroughly mixing 2 cwt. of steamed bone flour with each ton of superphosphate and leaving it in a heap for a day or two.

Lime must on no account be mixed with superphosphate because it converts the water-soluble phosphate into the reverted phosphate which is only soluble in dilute acid, and, if the mixing is carelessly done, a good deal of the phosphate will go back into its original insoluble state and be quite valueless.

It is sometimes stated that the acid superphosphates have a tendency to make land sour, particularly the heavy lands; but the proper way to correct any tendency in this direction is by giving the land an occasional dressing of lime. It has been calculated that 1 cwt. of lime per acre is more than sufficient to correct the acidity of any reasonable dressing of superphosphate, so that an ordinary agricultural dressing of burnt or ground lime would be sufficient for many years. It is well worth mentioning that on many soils, particularly the clays and sands, dressings of lime have a wonderful effect in increasing the result of subsequent dressings of superphosphate.

As a source of phosphatic food for plants, no manure is more reliable and certain in its results than superphosphate, but it must be borne in mind that it supplies nothing but phosphate, and that this is only one of the numerous food substances that plants require. A great many soils contain a fair quantity of nitrogen, abundance of potash, and all the other plant foods with the exception of phosphate, and it is on these soils that superphosphate is all that is required to increase considerably the crop yields produced. On other soils in which nitrogen or potash is deficient it is useless to apply large dressings of superphosphate alone, because the plant will have used up all the available nitrogen or potash and have ceased to grow before it has been able to utilize half the phosphate supplied by the manure. In such cases a suitable quantity of nitrogen or potash should be applied along with the phosphate.

Generally speaking, 3 cwt. of 26 per cent. superphosphate will supply all the phosphate required to make a complete manure with 1 cwt. of nitrate of soda (or ¾ cwt. of sulphate of ammonia) and ½ cwt. of sulphate of potash; indeed, a powerful general manure can be made by mixing superphosphate, sulphate of ammonia, and sulphate of potash in the proportions mentioned.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland of Liverpool write as follows, under date of January 20, with reference to the sales of West Indian Sea Island Cotton:—

Since our last report, about 100 bales West Indian Sea Islands have been sold, at from 20*d.* to 25*d.*, chiefly St. Vincent cotton.

Spinners continue quite indifferent buyers, some having considerable stocks left over from last season.

It is difficult to obtain over 20*d.*, except for extra fine quality, and at the moment the tendency is towards lower prices.

COTTON-SEED FACTORY AND COTTON-SEED PRODUCTS.

A cotton-seed oil factory, capable of dealing with 4 tons of seed per day, and including steam power delinter, with presses and refining outfit, would cost about £2,500.

The usual return of oil is at the rate of 40 gallons per ton of seed. Old cotton seed yields less oil, and that of a darker colour. Fresh seed is found to be more economical in working, while the oil is brighter and also sweeter in flavour.

The dry oil-cake yielded by a ton of seed after the extraction of the oil may weigh from 1,500 to 1,700 lb., depending on the age and quality of the seed.

SEA ISLAND COTTON MARKET.

Messrs. Henry W. Frost & Co. of Charleston, reporting on January 11 last, in regard to the market for Sea Island cotton, state:—

During the past week there has been a moderate demand for fully fine quality of cotton at 40c. per lb., and for fully fine to fine, but off in preparation, at 33c., the buying being for France. There is also some enquiry for crop lots, but at prices below the views of the planters.

On January 18, Messrs. Frost write:—

The sales for the week consisted chiefly of fine quality at 35½c. to 36c., and of stained to tinged cotton at prices ranging from 28c. to 33c. The larger proportion of the buying was on account of the Northern mills. Factors continue to hold firmly fully fine qualities at 40c., and the planters' crops at 43c. to 45c. and upwards, whilst they are willing to make some concessions in prices to sell the tinged and stained cotton, of which the receipts now largely consist.

COTTON IN CENTRAL AFRICA.

Referring to the cotton industry in British Central Africa, the *Annual Report* (1906-7) on the Protectorate states:—

The area under cotton in 1906-7 was 7,017 acres, or about 3,000 acres less than the preceding year, and less than one-third the acreage under cotton in 1904-5. At that time (1904) large acreages were put in without much regard to the variety sown, soil, or the prevailing climatic conditions. The results obtained under these circumstances were so disappointing that many planters felt compelled to discontinue cotton cultivation, and devote their attention to other crops. Next season it may be anticipated that more cotton will be planted, as many are awaiting a favourable opportunity for making a fresh start with this product. The varieties of cotton are getting acclimatized year by year, and the industry tends to become more firmly established.

PAPER MANUFACTURE FROM COTTON STALKS

The *Queensland Agricultural Journal* for September last, published the following note on the prospective manufacture of paper from cotton stalks:—

Paper manufactured from cotton stalks is of the strongest texture and softest finish. It is reported that several plants for the purpose of carrying on this manufacture will be erected during the next few months in certain American States. The practical effect of this new invention, if fully developed, would be to increase the present value of the cotton crop nearly £20,000,000 sterling annually.

The utilization of a waste product such as the cotton stalk, manufactured into commercial paper, will be a boon of inestimable value to the world. It will check the present increasing cost of paper, which is becoming such a burden upon the newspaper industry.

Mr. Harvie Jordan, President of the Southern Cotton Association, U.S.A., declares that the manufacture of paper from the fibre of the cotton stalk is one of the latest and most interesting inventions of the new century. Not only have the investigations passed the experimental stage, but they are rapidly being shaped so as to be placed into practical operation. Mr. Jordan says it has been unquestionably demonstrated that all grades of paper, from the best form of linen to the lowest 'news,' can be manufactured from this material.

Samples of unbleached paper prepared from cotton stalks, grown at Barbados, were exhibited at the recent Agricultural Conference, by Mr. Bert de la Mar of Trinidad.

THE COTTON WORM IN OLDEN DAYS.

From a chapter in the 'Natural History of the Island of Barbados', a book written by the Revd. Griffith Hughes, Rector of St. Lucy's parish, and published in 1750, it is evident that cotton was grown in the island in those days, and also that planters of the eighteenth century found the cotton worm as destructive a pest as it still proves to-day. In reference to this question, Mr. Hughes wrote:—

The cotton wool (of which in the East Indies they make their finest calico) is too well known to want a further description. Yet it would not be amiss here to observe, that as the inhabitants of the warmest climates want clothing, especially in the wet seasons of the year, indulgent Providence has sufficiently supplied the want of wool, here denied to the sheep, by causing a vegetable to bear the finest wool in the world.

However, the certainty of gathering a good crop of this kind is very precarious, since we may almost literally say of this shrub, that in the morning it is green and flourisheth, and almost in the same evening it decays and withers; for when the worms begin to prey upon a whole field of cotton trees, though they are at first scarce perceptible to the naked eye, yet in three days they will grow to a considerable bigness, and so devouring in that short time, they will reduce the most verdant field, thickly and beautifully clothed with leaves and flowers, into almost as desolate and naked a condition as trees are in the month of December in England, leaving often not a whole leaf remaining. By this means, especially if they come late in the year, they greatly prejudice, if not entirely destroy, the ensuing crop, and sometimes the very young trees are by this means killed.

These worms are of three sorts, all of the caterpillar kind and distinguished by the names of the 'black backs,' the 'streaked backs' and the 'fire worm.' The last is of a russet colour, and the smallest in size, but it is the most destructive. When they grow to their destined bulk, they spin and enwrap themselves in a bag or web, like silk-worms, in the few remaining leaves or any other covering. After a few days' rest in this, their Aurelia state, they turn into dark-coloured moths, and fly away.

These worms are observed most generally to make their appearance after sultry weather, especially if it thunders and lightens, as the weather is then more than ordinary sultry.

RICE CROP IN BRITISH GUIANA.

Reporting on the present season's crop of rice in British Guiana, the Demerara *Argosy* estimates that it will reach at least 300,000 bags, this being 50,000 bags over and above the amount consumed in the colony.

The question of export, therefore, becomes a very important one to the rice producers of British Guiana. Realizing this fact, one of the largest milling firms in the colony recently submitted samples of rice, grown on the banks of the Essequebo, to leading houses in the English and German markets, and the reports received are by no means discouraging.

The report on Demerara's rice, received from England, was to the effect that it was 'bold, handsome, well grown, and well separated, its only defect being in preparation, since it showed signs of fermentation.' The samples for the German market were submitted to merchants in Hamburg, where the largest rice mills in the world are situated. The report received from Hamburg commented on the inferior preparation of the grain which renders the product in its present state unsuitable for the English market, but the report added: 'we have seldom seen rice of such good grain, and if properly prepared, it should be worth a very good price.'

It is not at present easy to state exactly what are the particular defects of preparation of British Guiana rice, but improved methods however, will no doubt be brought into operation with further experience. In the meantime it may be noted, that the favourable mention of the quality of Demerara rice, contained in the above reports, is sure evidence of the possibilities which the future holds for the industry in the colony.

In connexion with the question of rice cultivation, the *Argosy* refers to the rapid development of the industry in the American States of Louisiana and Texas. In these countries the paddy fields are described as rising in natural tiers on either side of the rivers and creeks, and irrigation is cheaply and effectively carried out by means of a series of pumps, raising the water from tier to tier as the land rises. It is thought that this system could with advantage be brought into working in Demerara, along the banks of the rivers and creeks, and also at considerably less cost than in Louisiana or Texas. In those States, as a result of the adoption of this system, one man is able to do all the work necessary for the cultivation of 100 acres. Irrigation operations would necessarily be simpler, and less expensive in Demerara than in the American states, on account of the unvarying low level of land through which the principal rivers flow.

The possibilities of export in this line fully warrant the expense of irrigation operations. At present, most of the rice entering the English market comes from India and Rangoon, but both these sources of supply are rendered more or less unreliable on account of the occurrence of occasional drought. By the adoption of a thorough system of irrigation the question of drought would be reduced to a negligible quantity in British Guiana.

In conclusion, the *Argosy* quotes the remark of a prominent rice miller in the colony, who states: 'I have no hesitation in saying that, provided we can guarantee the quality of the rice, there is no reason why there should not be scope for an annual export trade from British Guiana of over 200,000 to 300,000 bags of rice.'

CROWN LANDS IN TRINIDAD.

The Warden of Naparima Ward Union, Trinidad, makes the following reference in his latest *Annual Report*, to the sale of Crown lands in his district of the island, and the disabilities put upon settlers by the suspension of traffic on the roads just at the crop time:—

The sale of Crown lands is steadily on the increase. This year, 2,786 acres were sold [in the Naparima Ward Union] against 2,701 last year, and 932 the year before. It is true the increase is not very much, but it would have been much greater if traffic on the roads had not been suspended. This annual stoppage is very discouraging to settlers. It takes place just at the time their provisions are ready for market, and this suspension means that all their perishable produce is lost to them, which is a serious throwback to men just starting the cultivation of a plot of land, and dependent on what they get from it for their subsistence.

Of these 2,786 acresof land sold, there were only one lot of 50, two lots of 40 acres, and all the other lots were under 25 acres

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The advancement made in agricultural education in the West Indies during recent years is discussed in the editorial. Proposals brought forward at the late West Indian Agricultural Conference for the institution of a systematised course of reading and examination for overseers and sub-managers of estates are of special interest.

A report on the work done during 1905-7 in connexion with the sugar-cane experiments carried on in Barbados is given on page 35.

The Red Spanish variety of pine-apple is the one most recommended for export trade by growers in Cuba. For home trade the Smooth Cayenne and other varieties give better results. Fruit growing in Porto Rico is giving good returns (page 36).

Market reports and other notes of interest in regard to the cotton crop will be found on page 38-9.

A brief article on page 37 deals with the properties and uses of superphosphate.

The development of the rice industry of British Guiana is making the question of European export trade in this product one of immediate interest. (p. 39.)

An article dealing with cattle and fowl ticks and methods for the destruction of these pests appears under 'Insect Notes' (page 42).

West Indian Students in Canada.

It is interesting to note that the number of West Indian students now in residence at McGill University, Montreal, is thirty-eight. All except one are white. Last year the number of students was fifty. The students from the several colonies are as follows: Jamaica, 17; Barbados, 13; Antigua, 3; Trinidad, 2; Demerara, 1; St. Lucia, 1; St. Croix, 1. The number taking Applied Science (Engineering, Mining, Architecture, etc.), is 19; Arts and Natural Science, 2; Theology, 2; Medicine, 15.

On the occasion of the visit of Sir Daniel Morris to the University, in October 1907, he met the students at the Union and gave them a short address. As a rule the West Indian students are reported to be steady and earnest workers, and pass their examinations successfully.

◆

Matches in Cotton Factories.

A question of importance to those in charge of cotton factories, and others, is being raised by the Administrator and the Agricultural Superintendent of St. Vincent, who are making enquiries as to whether action has been taken in any of the West Indian colonies to prevent the importation of matches which will ignite without the use of a specially prepared box.

The enquiry is made on account of the fact that sulphur matches are stated to have been sometimes found in seed-cotton sent to the ginneries in St. Vincent. It will readily be seen that this indicates a possible source of considerable damage to owners of cotton factories, and it may be added that the point also closely concerns the welfare of the sugar industry, especially during the crop season when canes are dry and easily set on fire. It would appear that at present, there are no restrictions whatever in regard to the use of sulphur matches in the West Indies.

◆

Best Method of Packing Limes.

The *West India Committee Circular* mentions that Mr. Frank Evans, Assistant Superintendent of the Botanical Department at Trinidad, who arrived in England at the close of 1907, brought with him a few packages of fresh limes from the island. These limes were put up in various ways, with a view to testing the effectiveness of the different methods of packing. The results were as follows: (1) packed in box, no paper wrapers, fruit arrived in bad condition: (2) packed in box, wrapped in tissue paper, fruit in fair condition: (3) packed in baskets, wrapped in tissue paper, fruit in good condition: (4) packed in baskets, wrapped in stiff newspaper, fruit in very good condition. This confirms the frequently repeated statement that limes packed in stout paper keep much better than those wrapped in tissue paper. The stouter paper appears to absorb the moisture, and experience has shown that limes so wrapped will keep a very long time.

Agricultural Prospects in Fiji.

The *Annual Report* (1906-7) on Fiji, recently issued by the Colonial Office, states that there is undoubtedly a good opening for the cultivation in that colony of such minor products as sisal hemp, ginger, limes, spices, tobacco, etc. The cultivation of rubber has hitherto hardly been attempted: successful efforts are, however, being made on at least two plantations to introduce this product. The growth of the existing trees shows that conditions are favourable to both the Para and the Ceara species. Large areas of land suitable for rubber cultivation can be obtained at moderate rates.

◆

Prevention of Plant Diseases.

The question of legislation, forbidding the importation of certain plants, with the object of preventing the spread of fungus diseases affecting those plants occasionally demands attention from Governments, and measures of this kind frequently save great loss to the agricultural community whose crops may be threatened by insect or fungus pests.

With the object of stamping out the American gooseberry mildew (*Sphaerotheca Mors-uvae*), which has been the cause of much trouble in Great Britain during the past season, the Board of Agriculture and Fisheries of that country has recently issued an order under which the landing in Great Britain of any gooseberry bush or currant bush, brought from any place outside the country is strictly prohibited. The order also provides that directly any bush is found to be affected with the mildew, the fact is to be reported to the Board of Agriculture, and the owner of the premises is forbidden to allow any gooseberry or currant bush to be removed, until, after inspection, the place is declared to be again free from the disease.

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Sweet Potato Crop.

Bulletin No. 10 of the Tuskegee Agricultural Experiment Station (Alabama, U.S.A.), deals with some points that should be observed by growers of sweet potatos, especially those who may wish to store a portion of the crop for a time.

It is stated that potatos dug after or during a long period of dry weather keep well as a rule, while those dug after or during a rainy season tend early to decay. Bruising or cutting the potatos in the process of raising also naturally lessens the keeping properties. In Alabama, the sweet potato crop is frequently attacked by a fungoid disease, the Black rot (*Ceratocystis fimbriata*).

Attention is drawn to the value of the vines as a nutritious food for stock. Results of analysis appear to show that these vines possess about the same feeding value as the young succulent pea vines. All kinds of stock eat them greedily when green, and drying by hanging them across fences or racks in the sun does not lessen their palatability.

Cane Farming in Naparima.

The Warden of the Naparima Ward Union, Trinidad, comments strongly on the methods of cultivation adopted by the cane farmers of his district. The greater part of the land occupied by these cane farmers is stated to consist of old sugar estates, abandoned by previous holders on account of the fact that it did not pay to grow canes on them. Yet the present occupiers plant canes year after year without the slightest assistance in the form of manure. It will readily be understood therefore that only small crops are obtained.

During the crop season of 1906 cane farmers obtained 9*s.* per ton for their canes at the commencement of the season. Owing to the shortage of the crop, however, the price subsequently rose to 14*s.* In 1907, planters were fully occupied reaping their own abundant crops, with the result that prices remained at 7*s.* per ton. In 1904-5 the quantity of farmer-grown canes raised in the Naparima Ward reached 85,266 tons, having a value of $184,669. In 1905-6, $256,053 were realized for the 73,428 tons grown, while in 1906-7 the farmers produced 135,133 tons of the value of $279,919. It will be seen, therefore, that the crop of 1907, although almost double that of the previous year, did not bring much increased profit to the farmers.

It is mentioned that in the Débe and Penal Settlements of the Naparima Ward nearly all of the new settlers are planting cacao in preference to sugar.

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Salt Industry in the Turks Islands.

The salt-raking industry which forms the mainstay of the Turk's Islands has during the past three years gone through a period of exceptional depression. Abnormally wet seasons occurred in 1904 and 1905, and this seriously interfered with raking operations and reduced the yields of salt. With the advent of a drier season in 1906, larger amounts of salt were prepared, but, on account of the inability of the salt pond owners to meet the demands of the two previous years, principal purchasers had, in the meantime, found other sources of supply, notably in the Trapani district of Sicily. It is further stated in the *Annual Report* (1906) on the Turks and Caicos Islands, that although a good market was formerly found for the salt in the United States, yet the opening up of native supplies, and the high protective duty of 6c. per bushel now levied on foreign salt imported into the country, make it a matter of impossibility for the salt producers of the Turks Islands to retrieve their losses.

While the total export of salt from the islands in 1903 reached 1,806,694 bushels, having a value of £23,678, it had fallen, by 1906, to 1,043,474 bushels, having a value of £14,276. Grand Turk has suffered more especially, the shipments from this island having fallen from 694,609 bushels in 1903 to 104,648 bushels in 1906.

In view of this decline of the salt-raking industry, it is all the more satisfactory to note the extension of the area devoted to sisal cultivation, and the increasing exports of fibre.

INSECT NOTES.

Cattle and Fowl Ticks.

A small collection of ticks was recently forwarded from the Imperial Department of Agriculture to Dr. George H. F. Nuttall, of Cambridge University, England, for identification.

These have been studied by Dr. Nuttall, and he has lately furnished the following information :—

The common cattle tick of the Lesser Antilles is determined as *Boophilus australis* and is closely related to the cattle tick of the Southern U.S. (*Boophilus annulatus*) the well-known agent of dissemination of Texas fever among American cattle. The gold tick of Antigua, sometimes called the St. Kitt's tick, is *Amblyomma variegatum.* This is closely related to the 'Bont' tick of South Africa. The common fowl tick which is found in several of these islands is *Argas persicus*, var. *miniatus.* This insect is distributed throughout tropical and sub-tropical America.

The remedies for cattle ticks have been given in previous numbers of the *Agricultural News*, and in a recent number (Vol. VI, p. 186), an account was given of successful treatment of a cow badly infested with ticks.

These consist of dipping, and spraying with any of the recognized tick washes.

The U.S. Department of Agriculture and the State officials in the tick infested States have devised a scheme of rotation pasture as a result of which entire farms and country districts may be freed from this pest.

Recently a correspondent of the *Louisiana Planter* has recommended molasses as a cure for ticks.

The directions include the use of molasses as a feed and a wash for the surface of the bodies of the affected animals. Molasses is fed with equal parts of water, and a mixture of one part of molasses, and two parts water is used as a wash. This is said to give satisfactory results.

The remedy may be worthy of trial in countries where molasses is cheap.

It may be of interest to note that the fowl tick is capable of remaining alive for a long time without food, or at least with no food available other than members of its own species. Early in 1904, specimens of this tick were received from a correspondent in Barbados. This gentleman was having a fowl house rebuilt, and it was found that an enormous number of ticks had collected in crevices in the boarding of the fowl-house. A small piece of board on which were perhaps a hundred ticks, larvae and adults, was sent in to the Department of Agriculture. This piece of board with the ticks, was placed in a glass jar, and the top covered over with a piece of cloth. Two years later a few of the ticks were still alive. This will show that in cases where fowl houses are infested with these pests it is not enough simply to remove the fowls from the house for a time. It will be necessary to thoroughly disinfect the house in all its parts. This might be done by thoroughly white-washing, or by the use of kerosene or crude petroleum Whitewash for this purpose should be made by slaking quick-lime in water to make a thick wash. Crude carbolic acid at the rate of 1 pint for each gallon of the wash should be added and thoroughly stirred in.

When used for the purpose of disinfecting a fowl-house or other out-buildings, lime wash, crude petroleum, etc., may be sprayed or applied with a brush, but care must be taken that every crevice is penetrated and every portion of the surface covered.

WATER AND SHADE FOR MILKING CATTLE.

Cows are frequently seen in the West Indies tied with a comparatively short rope to a post in the field, away from shade and water. The yield of milk obtained in such cases cannot possibly reach the return that would be given under conditions more in accordance with the bodily comfort of the animal, and cow keepers should realize that, apart from the question of discomfort to the cow, such treatment does not pay.

The accompanying notes in reference to this question are taken from the *Quarterly Journal* (October 1907) of the Bengal Department of Agriculture :—

As every one knows, milk contains, or should contain about 87 per cent. of water. In addition to the water necessary for the production of milk in the animal system, there must be sufficient for the ordinary vital processes in the body, therefore a supply of water should be given to an animal producing milk in such quantities as the animal itself wishes to take as drink. An ideal water supply is, of course, a clear running stream, but in default of this, a good supply of clear standing water that is not in the least stagnant, etc., will suffice.

Another important matter is that of shade. Milking cows must have shade, otherwise their yield of milk will be greatly diminished by reason of the fact that they become too hot in the full glare of the sun's direct light, uncomfortable and restless, and do not graze. Remembering also the worry caused by flies, it is easy to understand that the beasts, instead of feeding and forming milk, are wasting their time in moving about, tossing their heads and flicking their tails, etc. Not only is it essential, from the point of view of obtaining as large a milk supply as possible per cow, to provide shade, but this shade will also protect the beasts more or less from the flies, so that the hides of the cattle will be much less liable to become damaged. There is a certain fly [? *Hypoderma bovis*] that attacks exposed cattle, settling on their backs along either side of the back-bone, and there laying a number of eggs on the skin among the hair. These eggs develop into 'maggots,' which bore through the hide and live underneath ; but each maggot keeps an aperture open, through which to breathe. Thus, if there are many eggs laid, the hide on being taken off the animal is observed to be perforated in numerous places, and more especially at the part where the best leather should be obtained. Consequently the hide is reduced in value by 70 to 90 per cent. From what the writer has seen of Indian milk cattle, it is easy to understand that when the beasts are tied up with a short rope the whole day or part of the day, on a bare patch of inferior pasture, and away from water, the yield of milk, for all the above reasons, must be insignificant, and many of the hides damaged, not to speak of the pain suffered by the beasts from thirst and heat. Milk cattle should also have salt within reach.

AGRICULTURAL INDUSTRIES OF CUBA.

The U.S. Consular service in Cuba has prepared an interesting and complete report on the agricultural and industrial conditions which at present obtain in the island. The following forms a summary of the particulars given in reference to the agriculture of Cuba:—

Although nearly every portion of the island is suited to cane growing, it is estimated that not more than 2,000,000 acres (about one-fourteenth of the entire total acreage) is under cane cultivation. The opportunities for a profitable development of this industry are great. We have only to consider the millions of acres adapted to such cultivation to realize the incalculable wealth of the island.

Cuban tobacco, as is well known, is of superior grade. Pinar del Rio, the extreme western province, is the home of the highest grade of leaf grown, and nearly three-fourths of the total tobacco acreage of the island is contained in this province. The tobacco industry gives employment to about 100,000 persons. The cigar-maker's wage varies, an expert in making selected sizes sometimes earning $50 a week; a person employed in making the highest grade cigars receives for the work 15c. to 20c. each; others are paid from $10 to $15 per week.

In 1906, tobacco and manufactures of tobacco were valued at $36,702,586, an increase of $7,286,624 over the previous year.

The possibilities of the cultivation of citrus fruits in Cuba are great. The estimated cost of establishing a 10-acre orange grove on land valued at $50 an acre is as follows: Land, $500; clearing, $250; planting $150; 900 trees, $225; care for five years, $1,500; total, $2,625. Some fruit may be expected the third year. Varieties of orange, which have proved most satisfactory for cultivation in Cuba are the Pine-apple and Valencia, the first an early, and the second a later variety. In regard to grape fruit, Marsh's seedless and Duncan are the two varieties favoured for planting.

The pine-apple is indigenous to the island. The first shipment of 'pines' from Cuba was made to New York in 1870, and the industry is now an important and profitable one. The demands of the market are large. Sucker plants are worth $20 to $25 per 1,000, and an acre of pine-apples yields sufficient plants to stock from 3 to 5 additional acres.

PEASANTS' AGRICULTURAL SHOW AT BARBADOS.

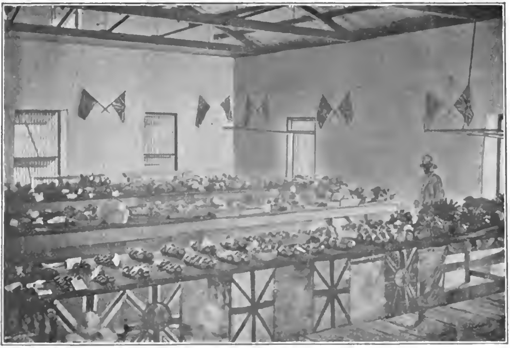
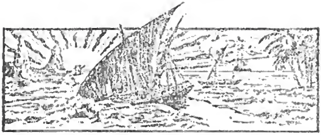


FIG. 1. PEASANTS' AGRICULTURAL SHOW, BARBADOS, 1907: FRUIT AND VEGETABLE SECTION.

A photographic view of some of the exhibits at the highly successful peasants' show of agricultural produce, held at Applewhaite's plantation on December 4 last, is here reproduced.

The view represented is that of part of the fruit and vegetable section, which was distinctly the chief feature of the show. Some indication of the abundance and quality of the citrus fruit exhibits, more especially, may be gained from the picture, while the decorations of the room bear evidence to the willing co-operation of Mr. Edghill (the attorney of Applewhaite's plantation) and his assistants, with those responsible for the arrangements of the show.

It will be remembered that a full account of the Exhibition was given in the *Agricultural News* of December 14 last (Vol. VI, p. 393).



GLEANINGS.

The present area under cacao cultivation in Jamaica is 6,021 acres.

The amount of cotton exported from Montserrat for the quarter ending December 31, 1907, reached 162 bales, having a weight of 59,115 lb. and a value of £4,417 16*s*.

Java produced 1,133,525 tons of sugar in 1906, as compared with 1,110,469 tons in 1905, and 1,102,871 tons in 1904. (*London Chamber of Commerce Journal.*)

The importations of cacao into the United States now average over $1,000,000 a month in value, as compared with a value of $250,000 ten years ago.

Pine-apple cultivation is one of the best established industries in Cuba. The annual crop varies from 600,000 to over 1,000,000 crates and is steadily increasing. (*Cuba Review.*)

The Department of Agriculture, Bengal, estimates the present season's crop of date palm sugar (from the wild date palm) *Phoenix sylvestris*) in India, at over 72,900 tons, while the amount of raw sugar obtained from the Palmyra palm will probably reach 2,937 tons.

The United States Consul at Porto Rico reports that the cultivation of tobacco in the island is extending more rapidly than that of any other product. Tobacco lands have risen in value, better methods of cultivation have been introduced, and new factories erected.

The American Sea Island cotton crop appears to be all got in. Messrs Henry W. Frost & Co's report, dated December 28 last, stated that the odd bags of cotton then coming in consisted largely of off, and stained cotton. The market was practically at a standstill during the week reported on.

The *Agricultural Journal* of Queensland reports a falling off in the 1907 arrowroot crop of the colony, as compared with that of the previous year. This is attributed to the fact that greater attention is being paid to the dairy industry, from which better returns are anticipated.

The gathering of the cacao crop is proceeding apace in Trinidad. On Wednesday, January 22 last, the railway achieved a record as regards the weight of cacao carried, no less than 2,400 bags having been brought into Port-of Spain. (*Port-of-Spain Gazette*, January 24.)

Although the fruit industry is a flourishing one in Porto Rico, growers and planters are under disadvantage owing to the bad condition of the roads. It is stated in a U.S. *Consular Report* that, owing to this, fully 40 per cent. of the entire orange crop is left to decay on the trees, causing great loss to the planters.

In reply to an enquiry from the Imperial Commissioner of Agriculture, Mr. John Barclay, Secretary of the Jamaica Agricultural Society, states that the present area of Sea Island cotton planted in the island consists of 200 acres, in lots of 10 acres and upwards, together with about 20 acres in smaller lots.

The question of rubber growing has lately been receiving considerable attention in Hawaii, and the *Hawaiian Forester* of November last, states that one company recently imported 210,000 seeds of *Hevea brasiliensis*. Of these 190,000 are to be planted at Nahiku on the island of Maui, 10,000 in Honolulu for experimental purposes, and 5,000 seeds at Koolu.

The *Port-of-Spain Gazette* mentions the sale, to a purchaser in Grenada, of the Courland, Auckenskeoch, and Goldsboro estates in Tobago. Cocoa-nuts form the chief product of these estates, the annual output being placed at about 220,000, 120,000 and 100,000 nuts respectively. Goldsboro estate is also producing cacao.

In further reference to the Labuan pomelow, an interesting citrus fruit of which a fine example was recently received by the Imperial Commissioner of Agriculture from Mr. Macgillivray of Tobago (*Agricultural News*, Vol. VII, p. 25), it may be mentioned that the colour of the flesh is pink, similar to that of a blood orange.

At a meeting of the St. Kitt's Agricultural and Commercial Society, held on January 6 last, the following members were elected to serve as officers for the current year: Hon S. L. Horsford, President; C. Forbes Todd, Esq., Vice-President; F. R. Shepherd, Esq., Hon. Secretary and Treasurer.

Reports from New York stated that up to Christmas the market had been glutted with oranges from Porto Rico, Florida, and Jamaica. All the fruits, however, were of poor quality, those from Porto Rico especially so, having been picked too early. Low prices only were realized. Very few oranges had been received from Cuba at the time of report.

The Maryland Agricultural Experiment Station, after testing formalin as a remedy for calf scour, announces that it has found one part of formalin in 4,000 parts of milk will almost invariably destroy the organisms in the bowels of the calf responsible for the disorder. Calf owners should dissolve ½-oz. of formalin in 15½ oz. of water, and add a teaspoonful of this liquid to each pound of milk fed to the calf.

Co-operation among agriculturists has developed in France probably to a greater extent than in any other country. The farmers' organization possess 8,501,695 members, forming 7,089 societies. As a result of this universal co-operation, agriculturists are able to buy and sell on the most advantageous terms, and have secured cheap transport for their products.

Fibre cultivation is being taken up by many planters in British Central Africa. The *Annual Report* (1906-7) on the Protectorate states that special attention is being given to Sisal and Mauritius hemps. During the year reported on, 27,250 young plants of these two fibres were distributed from the Botanical Department. This constituted the whole supply, but it is stated that three times this quantity would have been planted, had they been available.

GEOLOGY AND MINERAL RESOURCES OF BARBADOS.

The portions of Dr. Ells' paper which relate to the Geology and Mineral Resources of Barbados are here reproduced, in continuation of the extracts that appeared in the last issue of the *Agricultural News* (Vol. VII, p. 30), dealing with the island of Trinidad:—

In Barbados, the geological formations are somewhat different from those of Trinidad. Of the 166 square miles in the area, six-sevenths are occupied by coral limestone, which doubtless at one time formed a complete capping over the whole island. This coral formation reaches to the highest points of the island or about 1,100 feet above the sea, though to the ordinary observer or visitor the island is usually regarded as of but small elevation. The remaining seventh in the north-eastern portion shows a series of Tertiary sediments which are almost identical with those seen in Trinidad, and, like that island, contain petroleum and manjak in large quantities. They have been exposed by the denudation of the overlying coral, which presents bold escarpments facing to the east. Between the Tertiary rocks and the coral is a considerable thickness of earths and clay deposits, with an aggregate thickness of nearly 300 feet, which, with the overlying coral formation, are quite undisturbed.

The Tertiary oil-bearing sandstone and shale are more highly disturbed than those of Trinidad, the anticlines being sharper and the strata in places overturned for short distances. As in Trinidad, boring for oil has been carried on for some years as well as mining for manjak, and some fifteen holes have been sunk, several of which have been carried to depths of over 1,000 feet. In most of these oil has been found in some quantity and a pipeline and refinery were erected several years ago, the oil being pumped from the wells to the height of land whence it descended by gravity to the refining works near the city of Bridgetown. In certain cases the location of the borings was unsuitable, the sediments being too greatly disturbed to be largely productive of oil, so that the yield of petroleum in economic quantity has not been satisfactory; but at other places the conditions are more favourable, the strata being more regular and less broken, while beneath the coral and clay formations—the latter being known under the name 'Oceanic beds' the oil-bearing Tertiary probably occurs throughout the whole extent of the island. Here also, owing to the covering of impervious clays, the possibility of finding oil in paying quantity should be more favourable than in those portions where the clay and coral formations have been removed, as in the north-eastern portion. The thickness of the coral formation varies from a few feet only to 200 feet, and, in some places, possibly 250 feet, and the Tertiary rocks are sometimes seen, owing to the denudation of the coral, more especially in the southern and northern portions of the island. The judicious expenditure of a certain amount of capital by boring in this coral-capped area should be carefully considered.

In the Oceanic or clay and earthy deposits are large beds of infusorial earths, often beautifully white and resembling the infusorial earth obtained from the beds of lakes in eastern Canada. The microscopic examination of the contained foraminifera, however, shows that the forms are of deep sea water types instead of fresh water origin, as is the case with the northern lake deposits. These infusorial earths should at some time be of economic importance.

The manjak deposits of Barbados occur in true fissure veins as in Trinidad, the fissures undoubtedly being formed during the general period of upheaval which affected the Tertiary oil-bearing sands. The origin of this mineral is clearly seen in the case of the shaft referred to, where the manjak passed down at 150 feet into petroleum. The inference is, that this petroleum has flowed into the fissures thus formed, either from the sides or bottom, from the oil-sands which have been thus traversed; the volatile matters have been largely removed by oxidation, and the asphaltic portion has remained as a vein filling.

TOBACCO GROWING IN CENTRAL AFRICA.

The cultivation of tobacco is becoming more and more popular in the British Central Africa Protectorate. While in 1906, the area under tobacco was 955 acres, this had increased to 2,330 acres in 1907. In the latter year, too, the tobacco exports were valued at £6,889, as compared with £3,317 in 1906.

The following information on tobacco, furnished by the Blantyre & East Africa Co. Ltd., is given in the *Annual Report* (1906-7) on the protectorate:—

Tobacco is generally grown by planters, but owing to the season, the crop has not been quite so successful as in the previous year. The drought in January came at a very critical time, most of the plants having then only been recently set out or being ready to put out from the nurseries. Many of those in the field died, and the drought stopped the planting out operations. The result was that large numbers of the plants were lost and the full acreage could not be planted up. Following the dry weather, the continued rain was prejudicial. Some of the tobacco which was planted early could only be harvested at a disadvantage, owing to the wet weather, while the younger tobacco was affected by a (probably fungoidal) disease. This showed up in the cured product as black spots and depreciated the value of the tobacco. The proportion of first-class tobacco was therefore small, and the proportion of good bright yellow leaf was also much less than expected. In spite of all drawbacks, however, the total crop will exceed that of the previous year. The unfavourable conditions were much to be regretted, as efforts were being made to grow a leaf suitable for the home market, and, naturally, it was desired to make as favourable an impression as possible. There is, however, no doubt now, that excellent tobacco suitable for the British market can be grown in this protectorate.

Efforts during the last few seasons have been chiefly directed to the production of Brights (Yellow Leaf), and there is no doubt that Brights will pay the planter best as the prices rage from 6*d.* to 1s. per lb. on the Liverpool market. All estates, however, have not the class of soil most suitable for Brights, and on these a fine sun-cured tobacco has been produced. Although the price for dark leaf is lower than for Brights, the heavier yield, to some extent, makes up for the lower prices. It is interesting to note that Turkish leaf has been tried in the Protectorate for the first time during the past season, and that the results obtained promise success for this class of leaf. Cigar tobacco production has also received attention, and while it is too soon to pronounce a final verdict, the results, so far, are all favourable. It is hoped to be able to complete the curing of the leaf and subject it to the final test this year, viz., the test of the open continental market.

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CONCENTRATED LIME JUICE AND CITRATE OF LIME.

The following information as to methods of preparation of concentrated lime juice and manufacture of citrate of lime is given in continuation of the articles on lime growing, etc., that appeared in recent numbers of the *Agricultural News* (Vol. VI, p. 414: and Vol. VII, p. 14):—

CONCENTRATED LIME JUICE.

Lime juice for concentration should, when leaving the mill, be carefully strained in order to remove all seeds, and as much pulp as possible before it is run into vats. It is then placed in a still, in order to obtain the oil, and afterwards run to the tayches to be concentrated. It has lately been shown (*West Indian Bulletin*, Vol. VIII, p. 171), that lime juice, carefully strained and settled after distillation and before concentration, has obtained a special market and commands higher prices than ordinary concentrated juice.

Lime juice is usually concentrated before shipment to the citric acid makers in order to reduce bulk. It is usual to reduce at the rate of 600 gallons of raw lime juice to 50 gallons of the concentrated product. This is concentrating at the rate of 12 to 1. Some estates however, concentrate 10 to 1 and others 9 to 1. Even with low concentration there is a considerable loss of acid.

The juice is shipped to New York or London in hogsheads of 52 gallons, where it is tested and paid for according to the citric acid contents.

Planters can now test their own lime juice in the boiling house, and thereby save a considerable destruction of citric acid during concentration, by means of a citrometer or an ordinary specific gravity hydrometer. A description of a scale prepared by the Hon. Francis Watts, C.M.G., D.Sc., for use in ascertaining the strength of solutions of citric acid and of lime juice will be found in the *West Indian Bulletin*, (Vol. V, pp. 238-9), while a similar citrometer is described in the *Agricultural News* (Vol. VI, p. 149).

Care should be taken to remove as much of the impurities as possible, and lime juice should never be concentrated in iron tayches.

A carefully prepared juice, testing 100 to 105 oz. per gallon is a black, heavy, but not dense liquid. When no care is taken to strain or settle the juice, the product is as thick as molasses at the same degree of concentration.

When raw juice is prepared for shipment, it should be run to the setting vats through earthenware pipes, for it should never be allowed to come in contact with any metal.

The concentration of lime juice is carried out in open copper tayches, but it has been suggested that concentration in copper or wooden vessels fitted with steam coils would be an improvement over the present system. Now however, that the manufacture of citrate of lime has been successfully undertaken, it is doubtful whether any effort will be made at improvement in the present system of concentrating juice.

For boiling down the juice very considerable quantities of fuel are required, and on estates where fuel is scarce, it has been recommended that quick-growing species of Eucalyptus might be advantageously planted in odd corners of the estates. Once established, they could be cut over every two or three years, whereas native trees once cut down, are not ready for cutting again under at least ten years.

It takes from 1½ to 2 cords of wood, according to the degree of concentration, to boil down sufficient juice to fill a hogshead. On some estates, fuel costs as much as from 8 to 10*s*. a cord, while on others, where wood is plentiful, the cost is not more than 3*s*. to 4*s*. This question of fuel, combined with the cost of packages, and the high freight that has been paid on liquid produce, is of great importance, and when concentrated juice is selling at normal prices, i.e., from £12 to £12 10*s*. per hogshead, testing 133 oz. to the gallon, this industry cannot be said to be particularly attractive. At present, prices are high, and may remain so for some time.

CITRATE OF LIME.

In the manufacture of citrate of lime, the lime juice, on leaving the mill, is carefully strained, then distilled to obtain the oil, and afterwards, while still hot, it is run into a wooden vat to be neutralized with chalk. Before running into the mixing vat, the juice should be passed through filter bags (*West Indian Bulletin*, Vol. VIII, p. 167). The neutralizing vats are fitted with perforated steam coils to keep the juice hot, and to act as agitators during the time the chalk is being added.

A sufficient quantity of chalk is made with water into a cream. The mixture is poured cautiously into the juice until the whole of the acid is neutralized. To determine when neutralization has been accomplished, samples are taken from the mixing vat periodically and tested as follows:—To a small quantity of the mixture, some of the chalk and water cream is added, and if this produces an effervescence, more chalk must be added to the main quantity and further tests made. This is continued until the addition of chalk to a small quantity of juice produces no effervescence. When this occurs, the reverse test is carried out, viz.—a little of the supposed neutralized mixture is withdrawn and heated until all bubbles of gas are given off. A few drops of acid—fresh lime juice will answer—are added. A slight effervescence will take place if the requisite quantity of chalk has been added, but if there is too much chalk present, a brisk effervescence will be produced.

Buyers of citrate of lime penalize anything containing over 2 per cent. of chalk, and, therefore, care must be taken in the neutralizing process not to add excess of the chalk.

After neutralization the citrate is allowed to subside, and the mother liquor is then run off through a tap fitted in the side of the vat. Hot water is then run in and steam turned on to thoroughly wash the citrate. The citrate is washed several times, and finally it is agitated and run through a lower tap into the filter bags to drain. It is then placed in a press and finally conveyed to the drier. Recent experiments by the Hon. Francis Watts, C.M.G., show that the use of centrifugals is to be recommended for removing the water from citrate in place of the press, and it can be conveniently washed with a small quantity of hot water while in the centrifugal. When thoroughly dried the citrate should be placed in a room to cool before being tightly packed in barrels, hogsheads, or puncheons for export.

Citrate of lime is twice as bulky as concentrated lime juice, but it is not expected that freight on citrate will be higher than on concentrated juice, as the shipping companies give a preference to the dry over the liquid product.

At present, the greatest requirement in citrate manufacture is a drying machine that will dry the citrate in a few hours without any loss of acid. The driers chiefly in use are modelled after the pattern of the cacao drier described in the *West Indian Bulletin*, Vol. II, p. 173. The process of drying in this class of machine takes too long, and the consumption of fuel is too great for economical production of citrate. Citrate from which moisture has been removed by centrifugals can be dried in a much shorter time than the ordinary pressed product. If centrifugals were generally adopted and an improved drier brought into use, the manufacture of citrate of lime would be considerably simplified.

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FORMALDEHYDE AND ITS INFLUENCE ON FUNTUMIA RUBBER.

At a meeting of the London Section of the Society of Chemical Industry, the *Pharmaceutical Journal* reports that a paper was read by Dr. P. Schidrowitz and Mr. F. Kaye on the influence exerted on *Funtumia elastica* rubber by formaldehyde, when this latter substance is used to coagulate the latex.

These two workers have found that the rubber obtained from the latex treated by formaldehyde, although less elastic and resilient than that obtained by other means, was extraordinarily tough. They suggest that a rubber of this character might be particularly suitable for such purposes as the covers of motor tyres, where toughness is of greater import than resiliency, and that in future it may be found desirable to use different methods of coagulation for the same latex according to the purpose for which the rubber is intended.

RUBBER CULTIVATION.

The cultivation of rubber formed the subject of a paper read some time ago before the members of the Grenada Agricultural and Commercial Society by the Hon. W. Grahame Lang.

In an island like Grenada, where cacao forms the staple crop, it is probable that if rubber planting is taken up, the form of cultivation adopted will be that of growing the trees through the cacao crops. Mr. Lang, however, points out that in all parts of the island, and on every estate, there are plots of land unsuitable for cacao cultivation, but which would in all probability give satisfactory results under rubber.

The valuable information contained in a letter from an experienced planter of Para rubber in Burma formed the basis of some practical operations in rubber culture, which Mr. Lang has carried out, and this letter he read before the meeting. The following notes on the requirements of Para rubber, given by Mr. Lang's correspondent, are reproduced:—

'Para rubber requires an even temperature of 70° to 100°, but must not fall below 63°. Thrives best with a rainfall of from 80 to 160 inches, but will stand a drought of three months.

'It will thrive at elevations of from 100 feet up to 2,000 feet in suitable localities.

'The best soil for Para rubber is a rich friable loam—the deeper the better. Requires good drainage.

'If the young plants are raised in a nursery, the seeds should be sown at distances of 1 foot from each other. The plants are then set out when about eighteen months old. The best time to plant out is at the beginning of the rainy season.

'When land is under rubber only, the trees may be at distances of 15 × 15 feet, but when planted through cacao or other crops, they may be planted at distances of 20 × 20 or 25 × 25 feet.

'Tapping should not take place till the trees reach a girth of 2 feet at 3 feet from the ground. This will usually be in the seventh or eighth year of age.'

Mr. Lang has planted 4,000 Castilloa trees. Some time ago the trees were attacked with black blight and scale insects. Spraying with kerosene and whale-oil soap emulsion (10 lb. whale-oil soap in 20 pints of water, and 12 pints kerosene, water enough being added before cooling to make the whole up to 25 gallons), by means of a knapsack sprayer restored the whole to a healthy condition.

Hevea seeds to the number of 1,000 were obtained from Ceylon in November 1906, at a cost of £6 5s., including freight. These were immediately planted out, and 80 per cent. germinated. The young plants grew rapidly, and some were set out in their permanent positions two months after the seeds were sown. The whole were planted out by the end of March. Owing to the dry season a number of the young plants died, but as the result of experience, Mr. Lang was able to testify to the drought-resisting properties of *Hevea brasiliensis*.

In connexion with the question of raising the young plants, the reader of the paper expressed his opinion that the method of planting the seed at stake, in the position the trees were to permanently occupy, was, on account of its cheapness, and the smaller risk of damage to the young plants on account of rough handling, etc., preferable to raising plants in the nursery and afterwards setting them out.

With rubber, as in the case of young cacao, various catch crops can be raised for the first few years, and Mr. Lang mentioned that on his estate, cassava, peas, potatos, yams, and corn were growing among the rubber trees and doing well.

The rapid growth of Para rubber trees was referred to, many attaining a height of over 3 feet in ten months. The growth of the roots is equally rapid, and as the roots keep near the surface and radiate at considerable distance, care must be exercised in digging and forking the soil, or harm will certainly follow. Para rubber is not so liable to attack by blight as is Castilloa.

The question of the yield of rubber per tree and per acre was discussed in considerable detail by Mr. Lang, and from the figures quoted from Mr. Herbert Wright's book on rubber, it is evident that a return of 1 to 3 lb. of rubber per tree per annum should be obtained up to their tenth year, with an increasing yield in subsequent years.

Some attention is evidently being given to rubber planting in Grenada, since Mr. Lang mentioned that he and one or two friends had ordered a supply of 7,000 Hevea seeds.

FUNCTION OF RUBBER LATEX.

Mr. W. G. Freeman, B.Sc., F.L.S., Superintendent of colonial economic products at the Imperial Institute, and formerly Scientific Assistant on the staff of the Imperial Department of Agriculture for the West Indies, remarked at a meeting recently held at the Royal College of Science, London, that the exact use of the latex to the rubber tree is still a matter of discussion, but it is one of more than purely botanical interest.

A view which has had a considerable amount of evidence to support it, is that the latex tissues serve as a place of storage for water, to be drawn upon in time of drought. It has been observed in South America that Castilloa rubber trees growing under moist conditions develop very little latex, i.e. yield very little rubber, while trees growing under drier conditions yield latex more abundantly. If the latex really serves the function of water storage, it would be reasonable to expect that it would be developed to the greater extent in plants living under circumstances which made it necessary for them to store up moisture for periodical seasons of drought. That is to say, rubber plants growing in countries with well-marked dry seasons would have greater inducement to produce latex than those growing in continuously humid districts.

Under the latter conditions, the trees themselves would thrive and grow very freely, but they might yield less rubber, because the same necessity for moisture storage does not exist.

MARKET REPORTS.

London,—January 21, 1908, 'The West India Committee Circular;' Messrs. Kearton, Pipee & Co.; January 10, 1908, Messrs. E. A. de Pass & Co.; 'The Liverpool Cotton Association Weekly Circular,' January 17, 1908.

Arrowroot—St. Vincent, 2¼*d.* to 2⅝*d.* per lb.
Balata—Sheet, 2/4; block, 1/7 per lb.
Bees'-wax—£7 15*s.* per cwt.
Cacao—Trinidad, 90/- to 107/- per cwt.; Grenada, 80/- to 90/- per cwt.
Coffee—Santos, 30/6 to 31/3 per cwt.
Copra—West Indian, £19 10*s.* per ton.
Cotton—18*d.* to 20*d.* per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—No quotation per box.
  Pine-apples—St. Michael, 1/2 to 3/6 each.
  Grape Fruit—5/- to 7/6 per box.
  Oranges—Jamaica, 5/- to 7/- per box.
Fustic—£4 5*s.* to £4 15*s.* per ton.
Honey—16*s.* to 28*s.* per cwt.
Isinglass—West India lump, 2/- to 2/2 per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £18 per cask of 108 gallons; Distilled Oil, 1/9 to 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£4 5*s.* to £4 15*s.* per ton; Roots, no quotations.
Mace—Fair, 1*s.* 2*d.* per lb.
Nutmegs—68's to 69's, 7*d.* to 9*d.*; 75's, 6*d.* to 6½*d.*; 105's, 4¼*d.*; 111's to 115's, 3¾*d.* to 4¼*d.*; 121's, 3½*d.*; 138's, 3¼*d.*
Pimento—2⅝*d.* per lb.
Rubber—no quotation.
Rum—Jamaica, common, 2*s.* 10*d.* to 2*s.* 11*d.*; good, 3*s.* to 8*s.*; Demerara, 1*s.* 3*d.* to 1*s.* 9*d.*; Trinidad, no quotations.
Sugar—Crystals, 19/7½ per cwt.; Muscovado, no quotations; Molasses, 12/3 to 14/6.

New York,—January 24, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 18c. to 20½c.; Grenada, 18c. to 18¾c.; Trinidad, 17½c. to 18⅞c.; Jamaica, 15½c. per lb.
Cocoa-nuts—Jamaica, select, $25·00 to $26·00; culls, $16·00; Trinidad, $24·00; culls, $15·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c. per lb.
Ginger—10¾c. to 11c. per lb.
Goat Skins—Jamaica, 50c.: St. Thomas, St. Croix, St. Kitts, 38c. to 43c. dry flint; 29c. to 32c. dry salted: 30c. damaged.
Grape Fruit—Jamaicas, $5·00 to $8·00 per barrel; $2·25 to $4·00 per box
Limes—Dominica, $6·00 to $6·50 per barrel.
Mace—28c. to 30c. per lb.
Nutmegs—110's, 9½c. to 9¾c. per lb.
Oranges—Jamaica, no quotations.
Pimento—5⅝c. to 5¾c. per lb
Sugar—Centrifugals, 96°, $3·77 to $3·80: Muscovados, 89°, $3·27 to $3·30; Molasses, 89°, $3·00 to $3·05 per lb, duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., February 4, 1908; Messrs. T. S. Garraway & Co., February 3, 1908; Messrs. Leacock & Co., February 3, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $16·00 to $17·50 per 100 lb.
Cocoa-nuts—$11·60 to $17·50 per M. for husked nuts.
Coffee—Jamaica, $8·25 to $10·50 per 100 lb.
Hay—$1·65 to $2·00 per 100 lb.
Manures—Nitrate of soda, $62·60 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Onions—Madeira, $1·50 to $2·50 per 100 lb.
Potatos, English—$1·50 to $2·50 per 160 lb.
Peas—Split, $6·60 to $6·50; Canada, $3·40 to $3·50 per bag.
Rice—Demerara, $5·30 to $5·50 (177 to 180 lb.); Patna, $3·65 to $4·00; Rangoon, $3·00 to $3·19 per 100 lb.
Sugar—No quotations.

British Guiana,—January 25, 1908.—Messrs. Wieting & Richter; Messrs. Sandbach, Parker & Co.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 20c. to 21c. per lb.
Cassava—No stock.
Cassava Starch—$9·00 per barrel.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$5·00 to $5·25 per bag of 168 lb.
Eddos—$2·40 per barrel.
Molasses—Yellow, 18½c.; Dark, no quotations per gallon.
Onions—Madeira, 3c. to 3½c; Lisbon, 3c. to 3½c. per lb.
Plantains—20c. to 72c. per bunch.
Potatos,—Madeira, $2·70 to $3·00 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $4·25 to $4·75 per bag; Seeta, $6·00 per bag.
Split Peas—$4·00 to $6·75 per bag (210 lb.).
Tannias—$3·60 per bag.
Yams—White, $2·40 to $2·64; Buck, $3·48 per bag.
Sugar—Dark crystals, $2·15 to $2·45; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·50 per M.
——— Firewood—$2·40 to $2·64 per ton (3-feet lengths).

Trinidad,—January 25, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$16·75 to $19·00 per fanega; Venezuelan, $17·25 to $18·00 per fanega.
Cocoa-nuts—No quotation.
Cocoa-nut Oil—72c. per Imperial gallon.
Coffee—Venezuelan, 7c. to 8c. per lb.
Copra—$2·50 to $2·75 per 100 lb.
Dhal—$4·60 to $4·75 per 2-bushel bag.
Onions—$2·25 to $2·50 per 100 lb. (retail).
Potatos, English—$1·00 to $1·40 per 100 lb.
Rice—Yellow, $5·50 to $5·60; White, $5·50 to $6·00 per bag.
Split Peas—$6·00 to $6·25 per bag.
Sugar—$5·00 to $5·10 per 100 lb.

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Agricultural Banks.

THE question of the establishment of Agricultural Banks in these colonies is one which has often been discussed in various localities, more particularly in Jamaica. Information in regard to these useful institutions has frequently been given in the periodicals of the Imperial Department of Agriculture and the subject has received attention at more than one Agricultural Conference.

A particularly valuable contribution dealing with this question was the paper read before the West Indian Agricultural Conference held at Trinidad in 1905, by the Hon. Wm. Fawcett, Director of Public Gardens in Jamaica, which gave a clear review of the principal provisions of the 'Raiffeisen' system of co-operative loan banks, that have given such satisfactory results within recent years in Germany and Central Europe. Mr. Fawcett's paper, together with others dealing with the same subject, was reprinted under the title 'Information in Regard to Agricultural Banks,' as No. 35 of the Pamphlet series of the Imperial Department of Agriculture.

There is no need to dwell at length upon the advantage of a society or institution by means of which a thrifty peasant proprietor or holder is enabled to obtain, at moderate interest, a small amount of capital for the development of his land, on the security of the crops thereon. The value of these institutions is at once apparent. In every part of the West Indies there are small holders, willing to provide the necessary labour to work their land, but who occasionally, for various reasons, require the temporary need of a little extra capital. The ordinary banks do not lay themselves out to do business of this kind, and if the would-be borrower has recourse to a money lender, he is frequently charged an excessively high rate of interest, and the negotiation, instead of proving a means of assistance, often lands him in greater difficulties than before.

It is just such men as these that agricultural loan banks are designed to aid, and the value of such institutions has been so fully recognized in European countries that nearly 30,000 banks have been formed in different continental states on the 'Raiffeisen' co-operative system. The peculiar qualifications in virtue of which these associations are specially adapted to give aid just where it is needed, lies in the fact that under the Raiffeisen system, each bank confines its operations to a very limited area, and the managers are usually men with a good knowledge of matters agricultural. It will be seen therefore, that they are in a position to judge of the character of applicants for assistance, and also as to the sum which may judiciously be advanced. Sums lent are repayable in instalments with interest, at periods agreed upon.

The fundamental idea of the Raiffeisen system is that the members of the bank join together to pledge their common credit for the security of money deposited with them on interest, which is afterwards disposed of among themselves, or advanced to applicants at slightly increased interest, so as to cover expenses. The money must of course be applied to agricultural purposes. A primary feature of these associations is the unlimited liability of every member. As a result, the greatest care is exercised in electing trustworthy men only, since the other members know they will have to meet any default caused by one of their number.

A Committee of officials is elected to carry out executive work, but none of these are paid. Further, there is no distribution of dividends, all the profits being put towards the formation of a reserve fund. There is also a Council of Supervision, to which is entrusted the task of supervising and checking the Committee, while the Council themselves are subject to check by the whole mass of members.

In the West Indies, so far, little has been done towards the establishment of agricultural banks, but one or two were started on a small scale in Manchester parish, Jamaica, some years ago, through the efforts of local branches of the Agricultural Society. The necessity of some agency, by means of which peasant proprietors might be enabled to obtain temporary assistance in time of need, was brought prominently to the front as a result of the devastation caused on the lands of small proprietors by the hurricane of 1903.

From some cause or another, however, nearly all of the Agricultural Banks mentioned as having been established in Jamaica have ceased to exist, and at present only two institutions, the Christiana People's Co-operative Bank, Limited, and the Trinity Ville Bank, are carrying on operations in the island. These operations are, it is true, on a modest scale only at present,but the banks are undoubtedly doing good work and making satisfactory progress. The Christiana Bank has now a sum of £60 to its credit and this sum is steadily increasing. In a paper prepared for the Agricultural Conference of 1907, by the Revd. W. Turner, and published in the *West Indian Bulletin* (Vol. VIII, No. 3), a full account of the system of working of this bank is given.

At the recent Agricultural Conference, allusion was made to the Barbados Sugar Industry Agricultural Bank. This was established about a year ago, in order to carry out the administration of the free grant of £80,000 made in aid of the sugar industry of the island by the Imperial Parliament. The Directorate consists of the Colonial Secretary (Chairman), one member elected by the Legislative Council, four members elected by the House of Assembly, and one by the Agricultural Society. Loans, which can only be expended in connexion with the cultivation and management of the estate (except with the express permission of the Directors), are made to planters at 6 per cent. interest on the security of the growing crops.

Although the fund managed by this bank was originally granted 'in aid of the sugar industry,' yet planters whose chief crop may be cotton, are not debarred from obtaining assistance from the bank, provided they keep within the letter of the law by planting some sugar-cane.

In this connexion, too, it may be mentioned that, in continuance of previous efforts in the same direction, an Act (No 4 of 1907) to regulate advances in aid of the cotton industry was brought into force in the Leeward Islands during the past year. Its operations have been confined chiefly to Montserrat, Nevis, and Anguilla. Advances are made to large and small estates, but in most cases the borrowers are persons of small means.

Considerable interest has lately been aroused in Trinidad as the result of an announcement by Sir Henry Jackson, that he contemplates to lay before the Legislative Council, a scheme for the establishment of a Government Agricultural Loan Bank. Some years ago, a People's Bank, as it was styled, was established at Trinidad for the benefit of small holders and occupiers of land, and for a short time it did good work. Unfortunately, however, it fell through, but its temporary existence demonstrated the real necessity of some institution through which the peasant proprietors of the community might obtain assistance without being obliged to resort to money lenders. The announcement made by the Governor of Trinidad is apparently very acceptable to those in the colony who have continued to urge the establishment of some such means of agricultural credit.

The presumption that the scheme to be introduced by Sir Henry Jackson will be under Government control, is considered to be the best guarantee of its future success, for, unfortunately, the co-operative spirit does not at present seem to be sufficiently strong in these colonies to allow of the establishment of co-operative banks on the Raiffeisen system.

An Agricultural Bank, started under Government auspices at Trinidad, will be watched with considerable interest in the neighbouring colonies, and its success would prove a starting point for the establishment of similar institutions in other parts of the West Indies, and in British Guiana.

It may be mentioned that the question of Agricultural Banks has occasionally come up for discussion in British Guiana, where, owing to the large number of small rice growers in the colony, institutions of this nature should prove especially helpful. With a view to meeting the requirements of these rice growers, it has been suggested that arrangements for advances might be made on the lines of the cotton loans in the Leeward Islands, or that efforts should be made to start co-operative loan banks on the lines of the one at present working in Jamaica.

SUGAR INDUSTRY.

Central Sugar Mills in Queensland.

Some particulars in reference to the work carried on at the Queensland central sugar factories were given in the *Agricultural News* (Vol. V, No. 121). These factories are under Government control, the actual work of supervision being delegated to the Hon. Dr. Walter Maxwell, who holds the title of Comptroller. The mills are supplied with canes by cane farmers in the neighbourhood, and it would appear from the figures given, that cane farming in Queensland is fairly remunerative, since there has been a steady increase in the number of farmers each year from 1903-7.

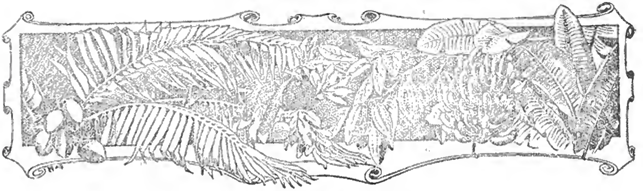
The following paragraphs are taken from Dr. Maxwell's report:—

The introduction of the cultivation of new varieties of cane into the districts around the mill is definitely raising the quality of the crops. These varieties were obtained from the Mackay Experiment Station, where their values are ascertained before they are distributed. Each of the mills has procured promising varieties, and is having them grown for distribution amongst the cane growers.

Each year renewed attention is given at the factories to the governing factor of clarification. The Comptroller wants steam power ample for all other purposes, and also to introduce the practice of maceration with cold water. Tests conducted personally some time ago showed that the extraction co-efficient of cold water is almost equal to that of hot water; and that cold water extracts a less proportion of impurities relative to the sugar extracted, which factor determines the proportion of recoverable sugar. With cane of relatively low purity, which obtains at most of the mills under the control, this is a matter of high importance

Also, in the clarification, the practice is being adopted, where practicable, of taking the lime juice into the clarifiers in its cold state. As the results of tests made some long time ago, it was demonstrated that the best clarification, especially of relatively low purity juices, is obtained by bringing the cold juices gradually to a high temperature, and finally to boiling point in the clarifiers The undisturbed state of the the juice, as it rises to the high temperature, allows the impurities to rise in a more solid layer to the top, and to be swept off without breaking, leaving a clear juice beneath. When the juice goes first into and through the 'heater,' in which course the heat is enough to coagulate certain of the impurities, and is then violently discharged into the clarifiers, a clarification results which is visibly more imperfect. Unfortunately, the equipment at some of the mills is not adequate to allow of this practice being followed. At the Gin Gin mill, the manager, Mr. Desplace, reports: 'Your instructions respecting the taking of the juice cold into the clarifiers were fully carried out. The results were excellent. Unfortunately, we cannot dispense with the heater until more clarifier capacity is put in.' The changes in methods of treating the juices are making apparent the further additions to the mill equipment that are necessary in order that the best work may be done. In the report of last year, the Comptroller remarked upon the 'high loss of sugar due to preventable causes' in the Mount Bauple mill. These causes received the Comptroller's very close attention during the last crushing. As a result, the losses have been reduced by between 5 per cent. and 6 per cent. upon the whole output as compared with previous years. These 'preventable causes' have, doubtless, operated ever since the mill began operations, and have only been located since the control has checked the mill operations by the laboratory. There is yet room for some further improvement with the aid of additional crushing power.

During the period from December 1903, to June 1907, white labour has taken the place completely of coloured labour, which had previously been employed upon given kinds of work. Also, during this period, the wages of white labour have been increased fully 20 per cent. in the mills in which the Treasury is in possession: and the living conditions of the workmen have been wholly reorganized at a very considerable cost. On another hand, the prices paid for cane during this period have been higher than at any other time in the history of the mills under consideration. All these several considerations, however, must not be allowed to conceal the fact that what has been accomplished at the mills under the control during the period specified has been due in a very notable measure to the favourable seasons that have obtained. Even with a continuance of good climatic conditions, it appears certain that the same high measure of success cannot continue, by reason of fiscal and economic changes that are now transpiring, and which are lessening, and must continue to lessen the margin of gain. Should unfavourable climatic conditions recur, then nothing can prevent less favourable and, in fact, serious financial results following. These considerations have emphasized the efforts made, on the one hand, to get the mills put into a thoroughly efficient working condition; and, on another hand, to encourage the placing of more producing settlers upon the land in order to secure an increased supply of cane. The situation, present and prospective, requires the exercise of the most careful device and economy if a measure of the recent success is to be maintained.



WEST INDIAN FRUIT.

MONTSERRAT PRESERVING INDUSTRY.

The Imperial Department of Agriculture has awarded a Diploma of Merit to the Montserrat Preserving Industry Company for excellence in producing guava jelly, preserved pine-apples, green tamarinds, preserved mangos, preserved limes, mammee apple cheese, and guava cheese.

The Secretary of this Society will be happy to correspond with persons desirous of information in regard to quality and prices. 'Guavarina' appears to be a special dainty supplied from Montserrat.

FRUIT INDUSTRY OF JAMAICA.

In order to supplement the information which appeared under the above heading in a recent number of the *Agricultural News* (Vol. VII, p. 20), the accompanying facts and figures on fruit production in Jamaica, are reproduced from the *Annual Report* (1906-7) on the colony :—

Fruit formed 53·7 of the total exports in 1906-7, as compared with 55·0 per cent. in 1905-6, and 41·8 in 1904-5. The absolute value of the fruit shipments, however, shows an advance as compared with last year, the banana exports alone having a value of £37,800 in excess of those of the previous year. During 1906-7, also, the number of cocoa-nuts exported from Jamaica was greater by 4,000,000 than those shipped in 1905-6. This represented an increased value of £15,800. It is remarked in the report that the increased export of cocoa-nuts indicates the gradual recovery of the plantations from the hurricane of 1903.

Grapefruit, limes, and lime juice were sent abroad in slightly increased quantity, but, on the other hand, the decline in the shipments of oranges that was first noticeable in 1903-4, still continues, and the returns for 1906-7 show a decreased value in the orange exports of £19,500 as compared with those of 1905-6.

Bananas, of course, take first place among fruit products and exports of Jamaica. The following are the number of stems exported in each of the past four years :—

1903-4	7,800,000
1904-5	8,900,000
1905-6	14,980,000
1906-7	16,000,000

The vast bulk of the crop goes to the United States, but the quantity sent to the United Kingdom, which was under 695,000 in 1904-5, rose to 1,217,000 in 1905-6, and 1,254,000 in 1906-7. In the same period the quantity exported to Canada has risen from 10,500 to nearly 118,000.

The number of oranges exported has fallen since 1903-4 from 82,600,000 to 55,100,000 last year, the shipments to the United States having declined from 64,200,000 to 18,400,000. On the other hand, the quantity exported to the United Kingdom, which was 12,100,000 in 1903-4, has risen to nearly 26,000,000 last year, and to Canada from 4,500,000 to nearly 10,000,000.

COCOA-NUTS IN THE FEDERATED MALAY STATES.

The Government Inspector of cocoa-nut plantations reported that at the end of the year 1906, there were very approximately 105,000 acres under cocoa-nut cultivation in the Federated Malay States. This represented an increase of 5 per cent. as compared with the area of 1905. Rather more than the half of this acreage is in bearing, and the value of the whole is roughly estimated at $20,000,000.

Owing to the great attention that is now being given to rubber planting throughout the Malay States, the cultivation of cocoa-nuts, in common with that of many other crops, is taking a secondary position. The annual production of copra, etc., however, indicates the existence of an important local industry. Taking an average return of forty nuts per tree—which is stated to be a reliable return when the trees have reached maturity it is estimated that if the whole of the yield were converted into copra, it would be capable of producing 17,500 tons. In addition to this, there is, of course, the large and valuable stock of fibre that would be available for the manufacture of coir matting, rope, etc.

The condition of the cocoa-nut plantations is described as being generally healthy, although attacks from beetle pests and caterpillars are reported as having occurred in one or two States.

Large numbers of cocoa-nut trees are being cut down to make room for Para rubber trees. As many of the trees are coming into bearing, and form valuable property, the Inspector comments on this policy as a mistaken one, and draws attention to the advantage of a mixed cultivation of rubber and cocoa-nuts.

At the end of his report, the Inspector, referring to the fact that cocoa-nut cultivation, although in favour with the native community, is not undergoing great extension, points out that, as a safe remunerative investment, cocoa-nut production is an industry hard to beat, and one which should receive every encouragement.

CACAO INDUSTRY OF THE WEST INDIES.

Interesting papers in relation to the West Indian cacao industry were read at the late Agricultural Conference. The Hon. Francis Watts, C.M.G., summarized, on behalf of Mr. Joseph Jones and himself, the results of manurial experiments with cacao in Dominica, while Mr. R. D. Anstead and Mr. J. C. Moore reviewed the progress of the experimental work carried on at Grenada and St. Lucia respectively. Mr. Joseph Jones also read a paper on trials in grafting cacao which have been made at the Dominica Botanic Station. A summary of Dr. Watts' remarks dealing with the Dominica experiments is given below, followed by a reprint of the paper presented by Mr. Anstead:—

CACAO EXPERIMENTS IN DOMINICA.

Manurial experiments are carried out in Dominica both at the Botanic Station and in the country districts. Those at the Botanic Station have been in progress since 1900, and now present results of considerable interest, clearly indicating the value of judicious manuring on the part of the cacao planter. There are five cacao experiment plots at the Station. Of these, one has been regularly manured each year with an application of 4 cwt. of basic phosphate and 1½ cwt. of sulphate of potash per acre, a second plot has been annually treated with 4 cwt. of dried blood per acre, and a third has received a complete manure (containing nitrogen, potash, and phosphates), composed of 4 cwt. of basic phosphate, 1½ cwt. of sulphate of potash, and 4 cwt. of dried blood per acre. The fourth plot has been annually mulched with grass and leaves, while the fifth has received no manure whatever.

Considering the crop returns obtained during the past five years, the results show that the use of phosphates and potash on the first plot has increased the yield of dry cured cacao by an average of 219 lb. per acre per annum over the yield given by the unmanured plot. The use of the dried blood alone, primarily a nitrogenous manure, increased the return of cacao by 187 lb., while the combination of the two sets of manures, i.e., phosphates, potash and dried blood resulted in an average yield of 374 lb. per acre per annum over and above that obtained from the unmanured plot. The mulching gave the greatest gain of all, viz., 402 lb. in excess of the return from the unmanured plot. Dr. Watts mentioned also that the cacao trees on the mulched plot are much finer and better developed than those on the other plots, and also that the soil of the mulched area is in exceptionally good physical condition. Although such good results have been obtained with mulching alone, Dr. Watts pointed out that in many cases it will be well to supplement mulching with moderate applications of nitrogen and phosphate. It is believed that potash is not urgently needed as a fertilizing constituent in Dominica, as the soils of the island are fairly well supplied.

The results obtained with the experiment plots in the country districts show that manures are beneficial and remunerative in the establishment of young cacao, and that pen manure, when obtainable is likely to give the best results.

Observation shows that good general results are likely to follow the intelligent use of the weeds growing in a cacao orchard. When the country experiment plots were first laid out in Dominica, attempts were made to keep weeds down thoroughly by a system of clean weeding. The soil showed signs of deterioration, but on altering the method of treatment, allowing the weeds to grow to a moderate height, and then either cutlassing them down, or bedding them in with the fork, surprisingly good results followed.

Mr. R. D. Anstead then read the following paper, reviewing the experimental work with cacao that is in progress at Grenada, of which island Mr. Anstead is Agricultural Superintendent.

In Grenada, experiment plots of cacao are of two kinds, distinguished, for the sake of reference, by the terms 'experiment plots' and 'experiment stations.'

The experiment plots, as was explained at the last Agricultural Conference (*West Indian Bulletin*, Vol. VI, p. 66), are each about 1 acre in extent, and are chosen from land near the public roads, belonging to peasant proprietors.

The experiments carried out upon these plots are conducted by the Imperial Department, and are designed to run for three years, the cost of them being defrayed from Imperial funds.

The results obtained by means of these plots are highly satisfactory. The Agricultural Instructor uses them as a rendezvous when he is in the district, and as demonstration plots. Here he is able to meet the peasants, and to show them how agricultural operations, such as forking, drainage and pruning, should be carried out, and how manures should be applied.

Considerable interest has been taken in the plots by the neighbouring peasants, and the operations carried out upon them are imitated to an encouraging extent. The plots were originally chosen in poor areas, and where trees have been considerably neglected, in order that the benefits of scientific treatment may be the more marked. A good crop serves as an excellent object-lesson to all cultivators of cacao, and indicates how the most satisfactory results are to be obtained. This year, for instance, from a plot 1 acre in extent, the owner has picked two-thirds of the total yield of cacao usually derived from 5 acres of land.

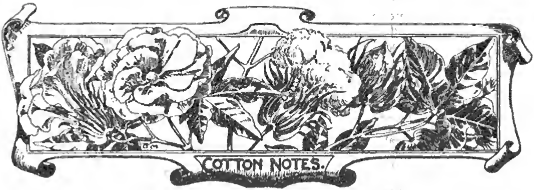
With regard to the actual results of the experiments, figures are kept as accurately as possible, and published from year to year in the Annual Report of the Botanic Station; but from a purely experiment point of view, and as a means of obtaining accurate numerical results, the second class of experiments—the 'experiment stations'—should afford better opportunities than the experiment plots, since they are on a bigger scale and are run more on estate lines.

These experiment stations are established on large estates and consist of not less than 5 acres, or 1,000 trees. The cost of the experiments is borne by the owners, the Imperial Department supplying scientific advice as to the experiments and the manner in which they should be conducted. These stations, of which there are at present five, have become very popular, and next year a number of others will be started.

The result of establishing them has been to make the larger proprietors take a lively interest in scientific experiments carried out on their own estates—experiments designed to answer questions and solve problems connected with their own soils and conditions.

It is as yet too early in the history of these experiments to be able to give, with any confidence, numerical results, but two facts are already apparent: firstly, that cacao grown on the heavy red clay soils of Grenada responds quickly and liberally to the applications of lime; and secondly, that pen manure, when applied in heavy dressings and thoroughly and deeply forked in, is of considerable value, and gives results that compare very favourably with mineral and chemical fertilizers.

Mr. Jones' paper on the grafting of cacao, and the paper read by Mr. Moore on experimental work at St. Lucia, will be reprinted in the next number of the *Agricultural News*.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland. of Liverpool, write as follows, under date of February 3, with reference to the sales of West Indian Sea Island cotton:—

> About 150 bales of West Indian Sea Island have been sold since our last report. Prices are easier, and there is very little enquiry, the position of the fine trade being exactly the reverse of what it was last year. The sales include Barbados, St. Kitt's, and Nevis, 19½*d.* to 21*d.*, and a few St. Vincent, 22*d.* to 23*d.*

SEA ISLAND COTTON MARKET.

Messrs. Henry W. Frost & Co., of Charleston, report as follows, on January 25 last, in regard to the sales of Sea Island cotton during the week previous:—

> The market was quiet during the week. There was limited demand for fully fine quality cotton at 40c., and stained to tinged cotton at 28c. to 32c. There is also some inquiry for planters' crop lots, but at prices below the views of the factors, and only one small crop has been sold for France on private terms. The following prices may be quoted: fully fine to extra fine, 40c.; fine, 35½c. to 36c.; fine to fully fine, but tinged and stained, 28c. to 33c.

On February 1, Messrs. Frost write:—

The market has been very quiet throughout the week, with very limited demand, resulting in the sale of only one small crop. Factors are showing more disposition to sell, and with orders in hand we think we can buy at some concession. Market quotations have undergone no change since last week.

COTTON GINNING IN ST. VINCENT.

The following note is from the *St. Vincent Times* of January 16 last:—

> Ginning operations at the Central Cotton Factory are now in full swing. We learn that seed-cotton is so rapidly handled there that any one giving notice could get their bale of lint within an hour after delivery of the seed-cotton at the factory. Up to the 14th instant, 127,642 lb. of lint have been ginned; twice as much as that ginned for the corresponding period last year. On the 19th ultimo, the factory made a record by ginning 4,779 lb. of lint on that day. It reflects great credit on the officers concerned, that the daily work done at the factory has exceeded the expectation of all, as with only two more gins they are nearly doubling last year's daily output.

COTTON LEGISLATION IN ST. CROIX.

An ordinance has lately been passed by the Colonial Council of St. Croix by which an export duty, of 5 per cent. of the value, is levied on all cotton grown in, and exported out of the colony, while a duty of 3 per cent. is imposed on exported cotton seed grown in the colony. It is enacted however that this duty must not exceed 6·25 francs (5*s.*) per 100 lb. of cotton, or 15 bits (1½*d.*) per 100 lb. of cotton seed.

On the other hand, the following articles for use in connexion with the raising of cotton and its preparation for market were, by the same Ordinance, exempted from import duty, viz:—cotton seed for sowing, implements and stuffs for use in disinfecting cotton seed and cotton; implements and machinery for use in sowing, cultivating, harvesting, cleansing and packing cotton and cotton seed, as well as ready-made bags, etc., for purposes of package of these products. Also, fuel for use in connexion with cotton machinery will be admitted free, on production of a certificate from the ginnery concerned.

COTTON GROWING IN CARRIACOU.

The reports relating to the cotton area of Carriacou for the season 1906-7 indicated that about 60 acres were planted with the Sea Island variety, and about 2,500 acres with Marie Galante cotton.

In reference to the Carriacou cotton area of the present season, the Imperial Commissioner of Agriculture recently received the following letter from Mr. R. D. Anstead, Agricultural Superintendent of Grenada, from which it shall be seen that the acreage planted with Sea Island cotton shows an increase of 100 per cent. as compared with the season of 1906-7. Mr. Anstead writes:—

> I have just received from the Commissioner of Carriacou an estimate of the area planted in cotton in that island, viz.,
>
> Sea Island cotton ... ... 120 acres.
> Marie Galante „ ... ... 3,000 „
>
> Writing on this subject on January 6, Mr. Whitfield Smith says: The growth of the plants was greatly retarded by the dry weather experienced during October and November, and at one time I thought the crop would be an utter failure. December, however, proved a favourable month on the whole, and there is a prospect now of fair average results being obtained, although the crop will be late. The cotton worm has not been troublesome this year. Indeed, owing to the vast flocks of blackbirds and hordes of ground lizards, insect life is not abundant in Carriacou. Dangerous kinds of scale insects do exist here and there, but they show no disposition to spread.

SEA ISLAND COTTON CROP.

The particulars given below are abstracted from an article in the *Cotton Trade Journal* of January last:—

The Sea Island cotton crop in sight up to the present time at the principal receiving ports is 50,046 bales, as against 40,771 bales at the same time last season. The total exports from all ports to date are 35,687 bales against 32,002 bales for the corresponding period a year ago. The stocks at Charleston and Savannah are 14,359 bales.

The markets continue dull and respond to nothing. Fancy quality Georgias show practically no change, but lower grade qualities show a tendency to fall slightly in price, as there is very little apparent demand for them. For other special staples the situation is about the same.

What is attracting most attention at present is the actual extent of the Sea Island crop. As shown above, the number of bales in sight this year is 10,000 in excess of the quantity of last year. What quantity is yet to come in is still a question. It is thought that a considerable amount is being held back, more especially in Florida, where the planters are well organized. The growers of that State have agreed upon a fixed minimum price, below which they refuse to sell, and they are supposed to be waiting for buyers to accede.

Meanwhile the general demand for goods manufactured from Sea Island cotton keeps normal. It is thought that there is an inclination among spinners to keep out of the Sea Island market for awhile in the hope that prices may show a downward tendency.

BARBADOS CO-OPERATIVE COTTON FACTORY.

The origin and establishment of the Barbados Co-operative Cotton Factory formed the subject of a paper read by the Hon. F. J. Clarke, C.M.G., Chairman of the Board of Directors of the Factory, at the late Agricultural Conference.

Mr. Clarke mentioned that the first cotton factory was opened in July, 1903, and was further enlarged in 1904. It was managed by a committee appointed by the Agricultural Society, in co-operation with the Imperial Department of Agriculture.

In view of the success that attended the cotton industry during 1903-4, the committee felt that the time had arrived when the factory might be carried on without Government or other assistance.

The Barbados Co-operative Cotton Factory Company, Limited, was registered under the Companies' Act in August, 1905, and the present factory was opened in January 1907. The building is equipped with a double expansion engine, a Stirling water tube boiler, twenty-four gins, a hydraulic baling press, and a seed disintegrator.

It now forms the largest Sea Island Cotton Factory in the world. The working of the factory has been highly satisfactory both to the cotton growers who utilize it for the ginning of their cotton, and to the shareholders, who have received good dividends.

At the conclusion of the paper, the Conference delegates paid a visit of inspection to the Cotton Factory under Mr. Clarke's guidance.

In this connexion it may be interesting to note the following facts and figures, taken from the latest report of the Directors, which relate to the results of working of the factory during the half-year ended September 30 last:—

After deducting the cost of material, labour, expenses of management, and minor repairs to house, the net profit for the half-year from April 30 to September 30, 1907, amounts to $5,850·30, which, together with the balance brought forward from April 30, 1907, makes a total of $8,676·05. Of this amount, the Directors have given as a bonus to the staff, the sum of $170, equal to one month's salary, and it was agreed that the balance, $8,506·05 be appropriated as follows:—

(1) That a dividend of 7 per cent., equal to 16·08c. per share, amounting to $2,036·83 be declared.

(2) That $1,000 be transferred to the reserve fund, bringing this fund up to $3,000.

(3) That 2 per cent. of the cost of erection of the factory buildings and plant be written off.

(4) That a bonus at a rate of 4c. per 100 ℔. of seed-cotton be given to those persons who have sent cotton to the factory to be ginned on their account. This will absorb $688·35.

(5) That the remainder, $4,179·93, be left to the credit of this account.

TOBACCO INDUSTRY OF JAMAICA.

An official of the U.S. Department of Commerce and Labour, stationed at Kingston, reports as follows on tobacco production in Jamaica:—

Tobacco in Jamaica is cultivated on about 300 acres. The tobacco districts are situated in the parishes of St. Andrew, St. Catherine, and Clarendon, in the southern part of the island. There is a good future for the successful cultivation of the leaf here, the required conditions of soil and climate being liberally afforded; in fact, it is claimed that Jamaican lands in certain localities are capable of producing 600 ℔. of tobacco per acre. The official statistics of 1906 give the number of cigar factories on the island as sixteen, four of which are equipped with machinery. One factory employs 200 persons and produced during the season 3,137,473 cigars and 30,020,122 cigarettes. Another firm employs 120 persons and produced 3,068,513 cigars and 12,342,160 cigarettes. Productions of other factories were appreciably less. The following quantities of tobacco (in pounds) were exported in 1906: Cigars, 40,325; cigarettes, 11,261; leaf, 6,554; the total valuation of which was $106,117. The larger percentage of these exports was taken by British possessions and by the United Kingdom. The shipments to the United States were valued at $1,435. A large modern tobacco factory is now being erected in the city of Kingston by American capitalists.

Reference is also made to the tobacco industry of the island in the lately issued *Annual Report* on Jamaica (1906-7), from which the paragraph below is extracted:—

There are several excellent cigar factories in Kingston, and the merits of Jamaica cigars are becoming slowly recognized. The demand for the tobacco is in excess of the supply, and in view of the special skill required in its treatment, the position in this respect will be changed only very gradually. Five of the chief factories produced last year quantities of cigars varying from 245,000 to 3,459,000 each, and two factories produced 3,000,000 and 23,000,000 cigarettes respectively. The cigarettes are chiefly made from imported tobacco.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The establishment and working of Agricultural Banks, a question of considerable interest to small holders and peasant proprietors in these colonies, is discussed in the editorial.

Some interesting particulars in regard to the working of the Government Central Sugar Mills in Queensland will be found on page 51.

Fruit shipments from Jamaica in 1906-7 show an increased value of £37,000 as compared with the previous year (page 52).

The results of cacao experiments in progress at Dominica and Grenada are summarized on page 53.

From the notes relating to the cotton industry it will be seen that market prices show little change, that the area under Sea Island cotton in Carriacou has doubled during the past year, that a small export duty has been placed on cotton and cotton-seed shipped from St. Croix, and that the Barbados Co-operative Cotton Factory is in a flourishing condition.

It has been thought that the vegetable ivory palm, from the seeds of which is manufactured a serviceable substitute for the genuine ivory, might be profitably cultivated in parts of the West Indies (page 58).

Brief descriptions of some of the chief fungus diseases affecting sweet potatos are given on page 59.

Rubber in Dutch Guiana.

Some account was given in the *Agricultural News*, Vol. VI, p. 313, of the agricultural industries of Dutch Guiana, and it was mentioned that a beginning had been made in rubber planting.

A correspondent, writing from Surinam, states that *Hevea guianensis*, which grows naturally, but in small quantity, in the interior, gives a fairly good yield of rubber of high quality. He also mentions that Para rubber (*H. brasiliensis*) does well in the colony, and that the area planted with this species is rapidly extending. On one estate several thousand trees are already established; and it is expected that within the next year double the number will be set out.

◆

Cacao Production in Ecuador.

As is generally known, the principal product of Ecuador is cacao, and the condition of this industry is reviewed in a recent report of the British Consul at Guayaquil.

From this it appears that the record crop of cacao produced up to the present was that of 1904, which reached 25,000 tons. In 1905, and again in 1906, the crop obtained was about 21,000 tons. The high prices which have recently prevailed, however, have more than compensated growers for the reduced output. The average price of cacao in 1905 was about £3 per 210 lb. at Guayaquil. In 1906 this had increased to £3 8*s.* per 210 lb., and a further rise of nearly 40 per cent. in the value of cacao took place in 1907, the average price for the year being £4 4*s.* per 210 lb.

The value of the cacao shipped from Ecuador in 1906 was £1,499,221, or somewhat more than half the value of the total exports of the country.

◆

Fungus Diseases of Sweet Potatos.

With reference to the note that appeared in the last number of the Agricultural News (Vol VII, p. 41) relative to the sweet potato crop, the Mycologist on the staff of the Department wishes to point out that the black rot of sweet potatos in Alabama was in 1891 attributed by Halstead and Fairchild to *Ceratocystis fimbriata*, Ell. and Hals., but that this fungus was subsequently found by the same authorities to be *Sphaeronema fimbriatum.*

The Mycologist further adds that he is aware of but one fungus disease that causes damage to the sweet potato crop of the West Indies. This is due to a white mycelium, most probably of a species of *Marasmius*, that envelopes the roots and eventually renders them unfit for food (*Agricultural News*, Vol. V, p. 285). Should any readers have knowledge of other fungus diseases of sweet potatos in the West Indies, it is hoped that they will communicate information, together with specimens if possible, to the Imperial Commissioner of Agriculture. On another page of this issue will be found details respecting fungus diseases of sweet potatos in other countries, which may serve as a guide.

Corn Selection by Agricultural Pupils.

A competition of an interesting nature, and one worthy of imitation in other parts of the West Indies has been carried out at the Antigua Grammar School.

In June last Dr. Watts offered, on behalf of Mr. A. M. Lee, prizes for the best samples of selected corn grown by the boys. The management of the competition was taken over by the Agricultural and Science Master (Mr. A. H. Kirby, B. A.), who instructed the boys as to the qualities to be sought for in the ears of corn chosen for seed purposes. Three ears were selected by each boy, and the seed was sown in any place where the boy could keep a watch on the growing plants. Four boys succeeded in bringing the corn to maturity, and each lad then chose, for the purposes of the competition, what he considered to be the ten best ears on his plot. These were submitted to Mr. Kirby who awarded the prizes.

Arrangements are being made at the school to hold a second competition of a similar nature.

Agriculture in Northern Nigeria.

From the *Annual Report* (1906-7) on Northern Nigeria, it is evident that although the Protectorate possesses very considerable agricultural possibilities, yet these are at present almost entirely undeveloped.

Tobacco is grown for local consumption, and it is stated that great things may be expected of this industry in the future. A considerable amount of experimental work will have to be carried out, however, before tobacco growing for export can be taken up.

Ground nuts are grown throughout the Protectorate in considerable quantity. Shea butter trees (*Butyrospermum Parkii*) are also fairly abundant. Large forests of gum arabic trees (*Acacia* spp.) exist, but it is stated that very little of the gum is collected.

Rubber forms the most valuable article of export from Northern Nigeria, and large acres could be rented at small cost for rubber growing. Funtumia seedlings to the number of 25,000 were planted last year at the Government plantation, and rubber seedlings of Para, Castilloa, and Funtumia are grown at this plantation and distributed free.

New Cacao Drier.

An illustrated description of a new apparatus for drying cacao by artificial heat, patented by Mr. H. Hamel Smith, appeared in the December number of *Tropical Life*, of which Mr. Smith is editor.

The principal feature of the drier is a large revolving wheel, on the circumference of which are a number of hollow cylinders in a horizontal position, and containing the beans to be dried. This wheel is enclosed in an outer case, and is fixed over a furnace, which supplies the necessary heat.

The provision of an aperture at the level of the furnace fire ensures the admittance of a current of air into the case containing the revolving wheel. This air is heated by passing around and over the furnace, before being led into the wheel chamber. It finally passes off by an aperture at the top. The smoke from the fire is led off by a flue built up on one side of the drier, and this also affords additional heat. In working, the small cylinders would be about half filled with cacao beans, and revolution of the large wheel, which is driven by hand power, ensures the constant turning of the beans. The apparatus costs about £150 for a small plant.

Suggested Oil Factory for St. Vincent.

The need of an oil factory for St. Vincent in connexion with the cotton industry of the island is discussed in a late number of the *Kingstown Times*. This need is all the more apparent at present because it is stated that the Barbados oil factory can take no cotton seed from St. Vincent for a while, as the available storage space is filled up with locally produced seed. Cotton growers in St. Vincent have in past years found a ready sale for their seed at the Barbados factory, but with the extension of the cotton area in the latter island, outsiders have to wait until the oil factory has dealt with the home-grown seed before they can get into the market.

The value of the cotton seed forms no inconsiderable part of the returns of a cotton grower, and this fact, together with the additional one that the seed experiences a loss of weight on storage, makes a planter anxious to get his seed to the oil factory as early as possible.

The *Times* suggests that the Government should erect an oil factory in connexion with their central cotton factory.

Lemon Curing.

Lemon trees are reported to flourish and to give good returns in many parts of Australia, and an article in a recent number of the *Agricultural Gazette of New South Wales* draws attention to the great improvement in the general quality of the fruit that would be brought about by the adoption of a good curing system.

It appears that this process is at present almost entirely neglected.

The writer of the article recommends that the fruits be gathered just as they are turning ripe. They should be allowed to stand for a few days in a large, airy building, after which they are packed in paper-lined boxes which may be stacked in such a manner as to allow a free circulation of air throughout. The fruits are looked over occasionally, and if they are found to be keeping well, they may be left for several months until they are thin-skinned and pliable, but they should be marketed before the skin shows the least sign of hardening.

The object in curing lemons is to reduce the thickness of the peel and make it tough; it also increases the juiciness, and keeps the fruit in good condition for a longer period than would be the case without curing.

A further advantage of curing lies, of course, in the fact that the fruits can, if necessary, be kept and put on the market when fresh fruit is not available or is scarce, thus giving a better return to the grower.

SCIENCE NOTES.

Vegetable Ivory.

In the *Agricultural News* (Vol. III, p. 108), reference was made to the manufacture of buttons, etc., from vegetable ivory—the product of the 'Ivory nut Palm' (*Phytelephas macrocarpa*).

Specimens of immature fruits have been forwarded to this office from Dr. H. A. Alford Nicholls, C.M.G., through the Curator of the Botanic Station, Dominica, and the following abstract has been made of a paper, prepared for the West Indian Agricultural Conference by Dr. Nicholls:—

The tree that bears the seeds known as vegetable ivory is indigenous to Panama, Colombia, and New Granada. It has a thick, rough, creeping trunk, from the under surface of which roots are given off. The leaves, which crown the stem, resemble in their size, shape, and disposition those of the cocoa-nut palm. The male and female flowers are borne on different trees, and the trunk of a male plant is always taller and more erect than that of a female.

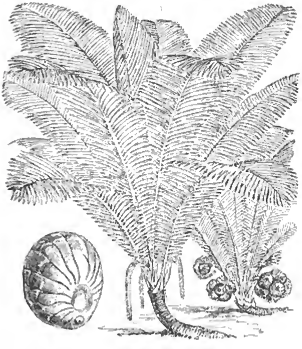


Fig. 2. Ivory Nut Palm.

The inflorescence of the male plant is a simple, fleshy, cylindrical spadix, about 4 feet long, with four or five spathes, and crowded with flowers, while that of the female plant, which also forms a simple but much shorter spadix, bears from six to seven flowers, pure white in colour.

The flowers exhale a powerful perfume, especially the larger white female ones.

The ripe fruit consists of three portions: an external one which is dark, rough, hard, and woody; a middle one that occurs as an oily pulp of a yellow colour, and sweet taste; and an inner portion—the seed—which is the vegetable ivory of commerce.

The fruits grow from the stem, just above the bases of the leaves, and they occur in collections of six or seven. Each fruit contains from six to nine seeds, or ivory nuts, as they are commonly called.

The seeds when quite young contain a clear, watery liquid used by travellers to quench thirst. Afterwards this liquid becomes milky and sweet, and finally becomes hard and opalescent. On exposure to light and air, it becomes white and opaque. It is softer and less brittle than ivory, and is therefore much used as a substitute for the more costly genuine article.

Large quantities of vegetable ivory are obtained from the banks of the River Magdalena, and are exported from Panama to the home markets. Most of the seeds are gathered by the natives from plants in a wild state, but it is not known whether the tree is cultivated to any extent.

It is suggested, therefore, that tropical agriculturists might profitably turn their attention to the cultivation of the vegetable ivory plant, for the constant increase in consumption of the article points to the success of such a minor industry.

Plants have grown well at the Botanic Stations of Jamaica and Trinidad, as well as at St. Aroment, Dominica, and it is thought that the plant should thrive along the banks of the rivers and streams of any of these islands.

AGRICULTURAL EXPERIMENTS IN ANTIGUA: VISIT OF PLANTERS.

A useful feature in connexion with agricultural experiment work is the arrangement for periodical visits by practical planters, as this gives opportunity for the visitors to see for themselves the aim and progress of the experiments, and also affords occasion to the officer in charge for imparting some useful information.

The *Antigua Standard* of January 11 last has the accompanying note on such a visit of planters to the Skerretts Experiment Station in Antigua:—

Monday, January 6, at three o'clock was the afternoon fixed by the Hon. Dr. Watts, C.M.G., Superintendent of Agriculture for holding a meeting of planters at Skerretts Experiment Station, for the purpose of inspecting the experiments at present in progress, and especially the recently introduced varieties of seedling canes.

At that hour a small gathering of planters assembled at the station, and were met by Dr. Watts, accompanied by Mr. Jackson, Curator of the Botanic Station, and Mr. Abbott, Assistant in connexion with the Agricultural Experiments. The gathering proceeded through the Experiment Station, where Dr. Watts pointed out and explained the chief particulars of interest, notably a large variety of experiments with cotton, and some new varieties of Guinea corn recently introduced from Northern Nigeria.

DEPARTMENT NEWS.

Mr. H.A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, left Barbados on February 9, by the S.S 'Sobo,' on a visit to Antigua, for the purpose of investigating the insect pests of cotton in that island. Mr. Ballou is expected to be away a fortnight.

Mr. George F. Branch, Agricultural Instructor at Grenada, has been granted an extension of leave for three months, from December 23 last, on half-salary.

OUR BOOK SHELF.
NOTES and REVIEWS.

CAROLINA RICE COOK BOOK: Compiled by Mrs. Samuel G. Stoney; *published by the Carolina Rice Kitchen Association, Charleston, S.C. Price 25c.*

The fact that rice forms the chief ingredient of the food of 54 per cent. of the inhabitants of the globe may well warrant the production of a small book compiled for the purpose of giving instructions as to different methods of cooking and serving this article of diet. It is with this object that the above booklet of ninety odd pages has been published, and since it issues from Carolina, it naturally lays special stress on the nutritious qualities of the well-known Carolina rice.

The book is divided into sections, and the several sections are composed of recipes giving instructions as to the use of rice in the preparation of breads, soups, fish, meat, and side dishes, sweets, and invalid diet.

In view of the abundance and cheapness of this article of diet, a booklet containing so much information on the subject of its preparation for food should certainly serve a useful purpose.

INSECTS INJURIOUS TO VEGETABLES: By C. F. Chittenden, D.Sc. *New York: Orange Judd Company; London: Kegan Paul, Trench, Trubner & Co., Ltd. pp. XIV + 262.*

This little book is specially adapted to the use of the general farmer, fruit grower, and gardener in the United States.

It is freely illustrated in the text with figures of the insect pests dealt with.

The subjects treated include a general outline of Entomology, prevention of injury from insects by proper farming methods, insecticides with directions for their preparation and use, general crop pests and the pests of various crops, grouped together according to the crops they attack. To this is added a useful bibliography.

Most of the subject-matter has been previously published by the author in the publications of the Bureau of Entomology of the U.S. Department of Agriculture.

This volume is of a very practical nature, and should be useful to agriculturists generally, but especially in localities where the crops mentioned are grown, and where the particular pests of these crops abound.

Coffee in Porto Rico. In the mountainous interior of Porto Rico there is a considerable area under coffee cultivation. It is stated that at present there are 17,000 plantations, comprising 185,000 acres, the average yield of which is 200 lb. an acre. The industry, however, is not in a flourishing condition, owing to inferior methods of cultivation and curing, and also to the difficulty of obtaining a remunerative market. (U. S. *Consular Report.*)

IMMIGRATION INTO CUBA.

The immigration movement into Cuba forms the subject of an interesting report lately issued by the Secretary of the Treasury of the Cuban republic.

From the figures given in the report it appears that during the fiscal year ending June 30, 1907, the number of immigrants entering the island was 29,572. Of these by far the greater number—no less than 22,171—came from Spain, 2,044 from England, and 1,709 from North America. Of the great Spanish influx, 18,261 were males and 3,917 females. These figures for the immigration of the past year show a great falling off as compared with those of 1905-6, when no less than 52,652 immigrants entered Cuba.

About half the Spanish immigrants are day labourers or field hands, a small number being artisans and traders.

FUNGUS DISEASES OF SWEET POTATOS.

The following brief descriptions of some of the chief fungus diseases of sweet potatos may be of interest:—

(1) The *West Indian* disease of sweet potatos is caused by the mycelium of a Basidiomycetous fungus (most probably a species of *Marasmius*) that envelops the roots underground, and eventually renders them unfit for use.

(2) *White rot.* This fungus attacks the roots and changes the tissues of the root into a whitish granular substance. The fungus is a Phycomycete, and the spores can live in the soil for a considerable period. Care should be taken not to plant sets coming from roots infected with this disease, and none of the diseased roots should be stored.

(3) *Black rot.* Dark brown or greenish spots are formed on the root. These spots become larger and extend deeper into the tissues of the potato, until finally the entire root turns a brownish-black. The affected potatos are totally unfit for use. It is caused by *Sphaeronema fimbriatum* (*Ceratocystis fimbriata*), and this fungus may attack the young shoots, producing black patches on the stems. The disease is then known as 'black shank.'

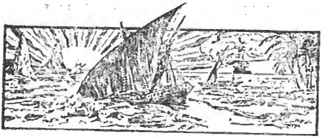
(4) *Dry rot.* The whole upper end of the root becomes much wrinkled and covered with small pimples. This condition progresses until the whole of the root is diseased and the interior converted into a dry whitish powder. This rot is said to be caused by *Phoma batatae.*

(5) *Scab.* This disease is confined to the surface of the root, upon which it makes its appearance first as a small brownish speck. This spot enlarges, and assumes a dark colour and rough appearance. Larger areas of the root may become affected, or often shrivelling takes place to a considerable extent.

(6) *Soil rot.* This disease is strictly a field disease, and the principal damage is confined to the early part of the season. It is characterized by the fact that the affected parts of the root cease to grow, while the adjacent portions not only continue growing, but remain perfectly healthy and edible. The roots therefore assume a shape somewhat similar to that of an hour-glass.

(7) *Soft rot.* This disease takes place chiefly where the roots are stored. An affected potato when broken open is found to consist of a black mass of spores. It is due to *Rhizopus nigricans*, a cosmopolitan fungus that gains entrance to the roots through wounds caused in digging or storing.

(8) *Stem rot.* This disease first appears on the stem at the level of the ground, and progresses both upwards and downwards. It is supposed to be caused by a species of *Nectria.*



GLEANINGS.

Rice production in the Naparima Ward Union of Trinidad showed a considerable increase during the 1906-7 season. While the crop of 1905-6 was approximately 5,400 barrels, that of 1906-7 was 9,120 barrels.

The rainfall in British Guiana for the year 1906-7 reached 95·51 inches. The highest rainfall on any one day was 3·24 inches, and the total for the year was above the average for the last twenty-five years. (*Annual Report.*)

The average yields of raw sugar obtained per acre in the chief beet-producing countries of Europe during the season 1906-7 are given as follows in the latest issue of *Sugar Beet*:—Germany, 4,400 lb.; Belguim, 4,118 lb.; Austria, 3,432; France, 3,220 lb.; Russia, 2,200 lb.

The British Guiana Government has made a concession on favourable terms, of land in Essequebo, suitable for sisal hemp cultivation, to a gentleman who intends to take up the cultivation on a considerable scale in the colony. (*Demerara Chronicle.*)

The total area of Crown lands in Jamaica is estimated in the latest *Annual Report* on the colony as 202,750 acres. During the year 1906-7, 247 acres were taken up, in forty-eight grants. None of these comprised 100 acres in area. The average price realized was £1 4*s.* per acre.

The 'Pocket Guide to the West Indies,' prepared by Mr. Algernon E. Aspinall, Secretary to the West India Committee, has evidently met with the ready sale that such a useful and interesting publication deserves, since we learn that a second edition is already in preparation.

In 1906-7 the United States imported 2,204,000 tons of sugar, valued at $108,000,000. Of this quantity, 1,600,000 tons, or more than two-thirds came from Cuba. The Dutch East Indies sent 224,000 tons, Porto Rico 204,000 tons, while Germany shipped 163,000 tons of sugar to the United States. (*Sugar Beet.*)

The post of an Agricultural Instructor at St. Lucia is now vacant. The salary and allowances of the post are of the annual value of £200 to £250, depending on age and experience. A sound knowledge of the cultivation and treatment of cacao, limes, and rubber is desirable.

The appointment of Science and Agricultural Master at the Grammar School, St. Kitt's, is now vacant. The salary is at the rate of £150 per annum with quarters free. Applications for the post may, in the first instance, be addressed to the Head-master, from whom further particulars can be obtained.

The *Cuba Review* reports that a large crop of oranges and grapefruit is expected in Cuba this year, although the trees have suffered much from drought. The pine-apple crop suffered from the same cause during 1907, the exports for the year being 650,776 crates as compared with 920,542 crates in 1906.

The Imperial Commissioner of Agriculture has received application for a large number of bulbils or bulblets of *Agave rigida*, var. *sisalana* (sisal hemp). Only plants of the true variety, with a terminal thorn, and without any side thorns are needed. Letters from persons having a supply for disposal should be addressed—Imperial Department of Agriculture, Barbados.

The *Port-of-Spain Gazette* learns that the demand in the American market for fine estate cacao is not as great as formerly obtained; and that planters would do well to pay more attention to the preparation of ordinary quality cacao, which must, however, be unclayed in order to meet the existing market.

Ground provisions, bananas, sugar-cane, and coffee occupy the largest acreages of cultivated land in Jamaica. The ground provision area is 113,995 acres; bananas are planted over 62,685 acres, while 29,182 and 27,783 acres are under sugar-cane and coffee respectively. The cocoa-nut area is 9,782 acres, and there are 8,586 acres of cacao in Jamaica.

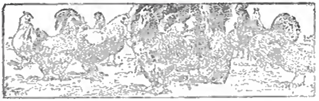
The *Annual Report* (1906-7) on British Honduras draws attention to the large sums spent annually in the importation of certain articles which might be produced in the colony. Chief among these are rice (annual value of imports, $40,673), live stock (annual value of imports, $40,494), raw tobacco (annual value of imports, $12,756), and coffee (annual value of imports, $11,231).

Some idea of the dependence of Great Britain upon foreign countries for her supplies of raw cotton may be gathered from the fact that while the British possessions buy from the mother country every year £40,000,000 worth of manufactured cotton goods, yet they send to Great Britain only £2,000,000 worth of raw cotten annually.

The total area of land under sugar-cane cultivation in Fiji amounts to 40,519 acres, from which in 1906, were produced 403,182 tons of sugar-cane The area planted with cocoa-nuts is estimated at 27,477 acres, while pine-apples and bananas cover 3,973 acres. Only about one-sixth of the area of the colony is under cultivation. (*Annual Report*, 1906-7.)

The annual consumption of sugar in Ecuador reaches about 8,200 tons, of which about 7,000 tons are produced within the republic. A protective tax formerly levied on all imported sugar was removed at the end of 1906, and the resulting fall in prices has so diminished profits to the home grower that it is extremely doubtful whether cane cultivation in Ecuador can be continued or not. (British *Consular Report.*)

From the *Board of Trade Returns*, it appears that the number of bales of cotton imported into the United Kingdom during the week ended November 7, 1907, was 115,174 (including 67 bales British West Indian, and 1,059 bales British West African), and the number imported during the period from January 1 to November 7, 1907, was 3,764,922 (including 5,816 bales British West Indian, and 9,917 bales British West African).



POULTRY NOTES.

Breeding and Feeding Table Chickens.

In the September number of the *Journal of Agriculture* of Victoria, Mr. H. V. Hawkins, Poultry Expert to the State, discussing the question of poultry breeds for the table, strongly recommends a cross between the Indian Game (cock) and the Silver Dorking (hens), as likely to give the best results from this point of view. Buff Orpington and White Orpington hens are also excellent crosses with the Indian Game cock. At five months old, chickens from the above crosses should weigh from 6¾ to 7½ lb.

With reference to the food most suitable for young chickens, and likely to produce the best white flesh, Mr. Hawkins says:—

Chickens should not be fed until quite twenty-four hours after hatching. Then give hard-boiled egg (shell included) chopped up finely, with double the quantity of bread crumbs, every two hours for the first few days. Give a little often, but on no account should any be left over, as sour food is disastrous to young chicks. When a week old, change the diet to coarse oatmeal and broken biscuits, slightly moistened with sweet milk: the mixture should not be pasty. Add a little charcoal and finely pulped raw onion. It is also very necessary that an ample supply of coarse sand, fine gravel, and a very small quantity of bone meal should be available to the young birds, as these are most essential to their proper development, i.e., to make bone and to keep the gizzard in a vigorous condition. Digestive disorders of all things should be guarded against; therefore avoid giving green bone, as there are perhaps more chickens killed by this than by any other thing.

Small Eggs.

An article in a late number of *Farm Life* dealt with the causes which influenced the production of small eggs by laying hens.

It was pointed out that overfed hens, or birds which are too fat, will frequently lay eggs smaller in size than those laid by the same birds when in proper condition. Similarly, the provision of warm, or stimulating, food will influence a hen to lay before the egg has attained its proper size.

The use of small eggs for hatching purposes is, however, stated as an undoubted reason why, in many cases, the resulting pullets should themselves produce eggs small in size. This is perhaps what one would naturally expect, on the principle of like producing like. It follows from this that the best way in which to bring about improvement with a given breed, is to select, for hatching purposes, eggs from those hens only which are distinguished by the large size of their produce, and to take care beforehand that these hens are mated only with male birds which are the offspring of hens of equally good laying strain.

RUBBER CULTIVATION IN MINDANO, PHILIPPINES.

The reports by the Bureau of Forestry in Mindano show that interest in rubber culture is increasing in that part of the archipelago. Many seeds and seedlings have been planted during the past year, especially in the district of Davao, the Island of Basilan, and along the east and west coasts of the Zamboanga peninsula. The reports show the following total number of trees growing on ten plantations at the present time:—*Hevea brasiliensis*, 9,000; *Manihot Glaziovii*, 61,000; *Castilloa elastica*, 1,000; total number, 71,000; or the equivalent of:—Para rubber, 47 acres; Ceara rubber, 313 acres; Castilloa rubber, 6 acres; total 366 acres. The ordinary planting distance in Mindano for rubber trees is 15 feet, but when intercrops are grown, the trees should be planted 20 feet apart.

CHOICE OF A MILKING COW.

In a leaflet 'The selection and milking of Dairy Cattle,' recently issued by the English Board of Agriculture and Fisheries, a good deal of detailed advice is given to those about to commence dairying. The hints as to the points to be looked for in selecting milking cows are worthy of reproduction.

The special points to be considered in the purchase and judging of dairy cattle are: Temperament of the animal; shape of the udder; general appearance denoting milking and feeding qualities; indications regarding quantity of milk yielded; and age and constitution.

The cow should be quiet when handled, possess a clean coat, and a long neck, with eyes prominent and wide apart.

The udder or bag should extend well forward; should be full and globular, flat underneath and well rounded behind, the whole vessel showing great capacity, each quarter being sound, and the teats easy to draw. The teats should be equal distances apart, squarely set on, and of a useful size for milking.

A first-class dairy cow is somewhat wedge-shaped when viewed from behind or from the side: the neck should be thin and longer than in a beef animal, whilst the shoulder should be light and oblique. The abdomen should be capacious, the flank clean and thin, being lean rather than fat. The back of a heavy milking cow is usually thin. The animal should also appear wedge-shaped when viewed from above, being narrow on the shoulder blades, with the lines spreading out to the hips, which should be wide apart. The thighs should allow plenty of space for the development of the udder.

The milk veins should be large, prominent, and branched, and the milk 'wells,' where the blood vessels enter the belly, highly developed. Milk veins are blood-vessels carrying away impure blood from the udder back to the heart and lungs for purification. As milk is derived directly from the blood, it follows that the greater the supply of blood passing through the udder, the greater the possibilities of the production of a large quantity of milk.

As regard constitution, a deep chest gives plenty of room for lung development, whilst wide and open nostrils commonly show great lung capacity. The ribs immediately behind the shoulder, if round and deep, make a big heart girth.

Cows which are heavy milkers are frequently thin and bony, and the buyer should never refuse a cow solely because of her 'poor' appearance, cases being known in which such animals have yielded upwards of 1,000 gallons of milk per annum.

CANADIAN RECIPROCITY CONFERENCE.

The following is an extract from the address made by the Hon. Sir Daniel Morris, K.C.M.G., at the opening of the Canadian Conference on January 15 last:—

Yesterday, at the opening of the Agricultural Conference, you received a welcome from his Excellency the Governor on behalf of the colony of Barbados. It remains for me this morning to meet those who have been appointed to the Canadian Conference, so that I may make a brief statement in regard to the circumstances under which this Conference has been called together: also to place before you papers and returns that may be useful in the discussion of a subject that all admit presents many difficulties. Among the papers is a reprint of an address delivered at a joint meeting of the Chamber of Commerce, and Agricultural Society of Barbados. That reprint also contains a short summary of proceedings at a similar meeting held at British Guiana. At both those meetings, resolutions were passed recommending that a Conference comprising representatives from all parts of the West Indies should meet at a central place, and discuss the possibilities of closer trade relations with Canada. As there was no other central organization existing in the West Indies to take action in a matter of this character, I regarded it as part of the duty of the Imperial Department of Agriculture to communicate with the several Governments and enquire whether it would be agreeable to them to send delegates to a Conference at Barbados. This question of closer trade relation with Canada has been slowly ripening for some time. For several years we have been sending exhibits of the products of the West Indies to Canada and these have been shown at Toronto and Halifax. In 1906 I was able to address meetings of business men in different parts of Canada, and on my suggestion, the various Boards of Trade sent Delegates to visit the West Indies and prepare a Report which is now before you. The Government of Canada has also in other ways taken steps to facilitate closer relations with the West Indies. The Boards of Trade have appointed West India Committees, with a Chairman and a Secretary to undertake correspondence with business men in the West Indies, and afford them assistance in regard to trade matters. In addition, the Dominion Government has appointed a general Trade Commissioner with headquarters at Barbados, who will travel through the West Indies and give information in regard to trade with Canada. The Trade Commissioner, I understood, will not necessarily take the place of any of the Canadian agents already existing.

The immediate cause which has led to the calling of this Conference is the fact that for some years we have had a favourable market in Canada for our sugar. The returns which are before you give particulars of the quantities of sugar, molasses, and syrup that have been imported into Canada during the last six years. These are taken from Canadian returns. They do not tally with the returns obtainable in the West Indies. That, as will be explained to you later, is due to the fact that, owing to the manner in which the statistics in the West Indies are kept, it is not possible to show what goods come from Canada by way of the United States, nor, on the other hand, to show the ultimate destination of goods shipped to New York. The returns will be useful as showing the large amount of trade that has sprung up in sugar between the West Indies and Canada. Practically 79 per cent. of all the sugar consumed in Canada has been obtained directly from the West Indies. I was assured, however, by business men as well as by others, that there were various circumstances likely to interfere with the continuance of a favourable market for the West Indian sugars in Canada. That is the reason why this Conference has been called more quickly than it otherwise would have been. If action be not taken at once, there is a possibility of the West Indies losing their favourable position in the Canadian market. I have been informed on undoubted authority that such is the case: and the gentlemen from Canada attending this Conference will confirm this. A prominent person in the United Kingdom has expressed the opinion that it would be a calamity if the West Indies lost their present market for sugar in Canada. These have been the main considerations in bringing about this Conference.

There is an impression that if the West Indies enter into closer trade relations with Canada, and give the Dominion advantages in this market, we shall antagonize the United States. I hope you will fully satisfy yourselves on this point. If you assume that the United States are going to penalize you because you enter into closer trade relations with Canada, you will raise a 'bogey' likely to neutralize any good results that may be obtained from this Conference.

In spite of the progress made with seedling canes, and the establishment of central factories, and with new industries, such as cotton and rice and the development of the lime industry, if we are suddenly confronted with the failure of the sugar industry, which is of the value of £2,700,000 a year, I am afraid the West Indies will receive such a set back, as will neutralize much of the work that has been done during the last ten years. That is the position as it now stands, and I leave it with confidence in your hands.

COFFEE IN HAWAII.

Owing to the extraordinary production of coffee in Brazil of late years, growers in other countries are being gradually pushed out of the market, unless their produce shows qualities of special value as in the case of Jamaica Blue Mountain coffee, which readily commands high prices on the London market. This difficulty of finding a sale for the lower qualities of coffee, and the necessity of turning to other articles of cultivation, are referred to in the course of the *Report of the Hawaiian Agricultural Experiment Station*, 1906, although it is stated that the best qualities produced in the Hawaiian Islands are in great demand. To quote from the report:—

The coffee industry is one especially adapted to the development of a stable population of small landowners. The coffee belt lies at an elevation of from 1,000 to 3,000 feet, the most salubrious location in the islands, a region of comfortable temperatures all the year round. Coffee does not require a large outlay of capital in its cultivation, and it is a crop which can be prepared for market without expensive machinery. When once prepared, it does not deteriorate; but, on the contrary, constantly improves with age, so that the producer is not subject to the great losses which frequently happen to those engaged in the production of perishable crops. The trees are remarkably free from disease, the yields are high, and returns sure.

The chief cause of failure as regards coffee growing in Hawaii is due to economic conditions. The best grades of Hawaiian coffees have always been in demand, and these grades sell themselves. The low grades, however, can not be produced in competition with Brazil and similar countries, and practically every small producer engaged in coffee growing in Hawaii has been forced out of business.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A. L. S., has forwarded the following report on the London drug and spice market during the month of December:—

At the beginning of December there was a slight improvement in certain articles at the spice and drug auctions, but the general character throughout the month was one of decided dullness, due both to the continued high bank rate, to the Christmas holidays, and to the New Year's annual stock takings.

At the first drug sale on the 5th, it was announced that the next sale would not take place till the middle of January. Our present report will therefore be of a brief nature, more especially as there is but little to say about West Indian products.

GINGER.

With regard to ginger, no Jamaica was offered at the first auction and the other kinds were quite unimportant. At the second auction on the 11th, Jamaica was represented, and 38 bags and 5 barrels sold at the following rates: Good ordinary, 70*s.*; ordinary small, 65*s.*; and dark, 62*s.* 6*d.* Some ordinary washed rough Cochin, in bags, was offered and bought in at 36*s.* per cwt. On the 18th, all the offerings, which consisted of 180 packages of Jamaica, were bought in, and there was no further business done in this article during the remainder of the month.

NUTMEGS, MACE, AND PIMENTO.

A very quiet trade was done in nutmegs. On the 11th, 21 packages of West Indian were disposed of at 4½*d.* for 111's, and 1*s.* for 65's, there being no dealings at a later period. Mace at the same sale realized for dark red West Indian 1*s.* 1*d.*, at which rate 2 packages were sold. Fair Penang was bought in at 1*s.* 7*d.* No further dealings were reported. Small sales of Pimento were also made at the same auction at 3*d.* per lb., at which price a few bags were disposed of on the 18th, but no sales were made later.

ARROWROOT.

This article was not much in evidence during the month, but at the sale on the 11th, the offerings of St. Vincent amounted to 196 barrels, but a few only were sold at 2⅜*d.* per lb. for good manufacturing. Some sales were effected privately at from 2¼*d.* to 3⅜*d.* for fair to good fair manufacturing, and 2¾*d.* for good, while fine commanded 4*d.* per lb.

SARSAPARILLA.

At the first drug sale on the 5th, 15 bales of genuine grey Jamaica were disposed of at 1*s* 8*d.* per lb. for good fibrous, but partly coarse: 1*s.* 6*d.* per lb. was paid for 3 bales of partly black mixed, and for a consignment of 15 bales from Ecuador, of the character of Guayaquil, 4 only were disposed of at 11*d.* per lb. One bale of native Jamaica, common mixed grey and red, was bought in at 1*s.* per lb. Though information was at hand in the middle of the month of the arrival of 6 bales of grey Jamaica, and of the same quantity of native Jamaica, these had not yet appeared at auction.

CANELLA ALBA, KOLA, LIME JUICE, TAMARINDS, ETC.

For Canella bark, of which 5 bales of fair bright, mostly pale quill, were offered in the early part of the month, 65*s.* was quoted. Good West Indian, partly washed, kola, also offered at the same sale, sold at 2½*d.* to 2¾*d.*, and ordinary at 1½*d.* At the first spice sale lime juice was represented by 11 packages of raw West Indian, which realized 1*s.* 3*d.* per gallon: also 2 hogsheads of raw Dominica were sold at 1*s.* per gallon. Private dealings were also made in good row Jamaica at 1*s.* 5*d*, and fair at 1*s.* 3*d.* Four cases of West Indian distilled oil of lime realized 1*s.* 9*d.* per lb. Black Calcutta tamarinds were bought in at 13*s.* per cwt., and fair Ceylon annatto at 2¾*d.*, and ordinary 2¼*d.* per lb.

MILLIONS IN ANTIGUA.

The Hon. Francis Watts, C.M.G., has forwarded the accompanying note in reference to the small fish known as 'millions,' which, as mentioned in the *Agricultural News*, was recently identified by Mr. G. A. Boulenger, F.R.S., of the British Museum as *Girardinus poeciloides*:—

The small fish which in Barbados is known as 'millions' were introduced from that island into Antigua in August 1905, by the Imperial Department of Agriculture.

They were found to thrive exceedingly well in the ponds and tanks at the Botanic Station. From the Botanic Station they were distributed to various ponds and streams.

It is interesting to record that the Country Health Board, being convinced of the useful part played by these fish in consuming mosquito larvae, have arranged for their systematic distribution throughout the ponds and streams of the island. The official reports show that these fish are now abundant in every district and practically in every pond and stream.

DOMINICA AGRICULTURAL AND COMMERCIAL SOCIETY.

A general meeting of the above Society was held on December 28 last.

The first subject which received attention was a communication from Sir Daniel Morris, covering a letter from Mr. W. N. Sands, Agricultural Superintendent of St. Vincent, with respect to an enquiry from Messrs. Robertson Bros., Ltd., of Toronto, Canada, for samples of sweet potato flour and starch. Copies of the correspondence were provided for planters who thought of taking up the matter, and these planters were asked to submit the prices at which they would be able to supply the flour and starch.

Mr. A. R. C. Lockhart was appointed to represent the Society at the late West Indian Agricultural Conference held at Barbados.

A letter on the subject of means of communication and trade relations between the West Indies and Canada, sent by the West India Committee in October, 1907, to the Hon. W. S. Fielding, Canadian Finance Minister, and reprinted in the *West India Committee Circular* of December 10 last, came up for consideration by the Society. The Secretary was instructed to inform the West India Committee that the Society was in general accord with the views and suggestions expressed in the letter referred to, as to means whereby relations between the West Indies and Canada might be improved.

The Society also carried unanimously a motion, in which it pledged its support to the French Compagnie Générale Transatlantique, if this company, by calling regularly at the island, would afford shippers of Dominica an opportunity to establish trade relations with France.

MARKET REPORTS.

London,—February 4, 1908, 'The West India Committee Circular,' Messrs. Kearton, Piper & Co.; January 24, 1908, Messrs. E. A. de Pass & Co.; January 31, 1908. 'The Liverpool Cotton Association Weekly Circular.'

Arrowroot—St. Vincent, 2½d. per lb.
Balata—Sheet, 2/4; block, 1/7 per lb.
Bees'-wax—inferior to dark, £6 15s. to £7 5s.; fair to good bright, £7 10s. to £7 12s. 6d. per cwt.
Cacao—Trinidad, 84/- to 94/- per cwt.; Grenada, 74/- to 82/- per cwt.
Coffee—Santos, 30/7½ to 31/3 per cwt.; Jamaica, ordinary to fine ordinary, 35/- to 42/6; ordinary fine to ordinary, 40/- to 52/-; middling bold, 61/- per cwt.
Copra—West Indian, £18 10s. to £19 per ton.
Cotton—West Indian Sea Island, good medium, 18d.; Medium fine, 19d.; fine, 20d.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—No quotations.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—4/6 to 6/6 per box.
  Oranges—Jamaica, 5/3 to 7/- per box.
Fustic—£4 to £4 10s. per ton.
Honey—20s. to 27s. 6d. per cwt.
Isinglass—West India lump, 2/4 per lb.; cake, no quotations.
Lime Juice—Raw, 1/2 to 1/8 per gallon; concentrated, £15 5s. per cask of 108 gallons; Distilled Oil, 1/9 to 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£4 to £4 10s. per ton; Roots, no quotations.
Mace—Fair, 1s. 2d. per lb.
Nutmegs—68's to 69's, 7d. to 9d.; 75's, 6d. to 6½d.; 105's, 4¾d.; 111's to 115's, 3¾d. to 4¼d.; 121's, 3½d.; 158's, 3¼d.
Pimento—2⅜d. per lb.
Rubber—No quotation.
Rum—Jamaica, no quotations; Demerara, 1s. 2½d. to 1s. 4d.; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, no quotations; Molasses, 12/- to 15/-.

New York,—January 21, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 18c. to 20½c.; Grenada, 18c. to 18¾c.; Trinidad, 17½c. to 18¾c.; Jamaica, 15½c. per lb.
Cocoa-nuts—Jamaica, select, $25·00 to $26·00; culls, $16·00; Trinidad, $24·00; culls, $15·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c. per lb.
Ginger—10¾c. to 11c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 38c. to 43c. dry flint; 29c. to 32c. dry salted; 30c. damaged
Grape Fruit—Jamaicas, $5·00 to $8·00 per barrel; $2·25 to $4·10 per box
Limes—Dominica, $6·00 to $6·50 per barrel.
Mace—28c. to 30c. per lb.
Nutmegs—110's, 9½c. to 9¾c. per lb.
Oranges—Jamaica, no quotations.
Pimento—5¼c. to 5¾c. per lb
Sugar—Centrifugals, 96°, $3·77 to $3·80; Muscovados, 89°, $3·27 to $3·30; Molasses, 89°, $3·00 to $3·05 per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., February 18, 1908; Messrs. T. S. Garraway & Co., February 17, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $16·00 to $17·00 per 100 lb.
Cocoa-nuts—$12·25 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·75 to $2·00 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—11c. per gallon.
Onions—Madeira, $3·50 per 100 lb.
Potatos, English—$1·20 to $2·05 per 160 lb.
Peas—Split, $6·20 to $6·50; Canada, $3·30 to $3·35 per bag.
Rice—Demerara, $5·60 to $5·65 (180 lb.); Patna, $3·65 to $4·00; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana.—January 25, 1908.—Messrs. Wieting & Richter; Messrs. Sandbach, Parker & Co.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 20c. to 21c. per lb.
Cassava—No stock.
Cassava Starch—$9·00 per barrel.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$5·00 to $5·25 per bag of 168 lb.
Eddos—$2·40 per barrel.
Molasses—Yellow, 18½c.; Dark, no quotations per gallon.
Onions—Madeira, 3c. to 3½c; Lisbon, 3c. to 3½c. per lb.
Plantains—20c. to 72c. per bunch.
Potatos,—Madeira, $2·70 to $3·00 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $4·25 to $4·75 per bag; Seeta, $6·00 per bag.
Split Peas—$4·60 to $6·75 per bag (210 lb.).
Tannias—$3·60 per bag.
Yams—White, $2·40 to $2·64; Buck, $3·48 per bag.
Sugar—Dark crystals, $2·15 to $2·45; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·50 per M.
———Firewood $2·40 to $2·64 per ton (3-feet lengths).

Trinidad,—January 25, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$16·75 to $19·00 per fanega; Venezuelan, $17·25 to $18·00 per fanega.
Cocoa-nuts—No quotation.
Cocoa-nut Oil—72c. per Imperial gallon.
Coffee—Venezuelan, 7c. to 8c. per lb.
Copra—$2·50 to $2·75 per 100 lb.
Dhal—$4·60 to $4·75 per 2-bushel bag.
Onions—$2·25 to $2·50 per 100 lb. (retail).
Potatos, English—$1·00 to $1·40 per 100 lb.
Rice—Yellow, $5·50 to $5·60; White, $5·50 to $6·00 per bag.
Split Peas—$6·00 to $6·25 per bag.
Sugar—$5·00 to $5·10 per 100 lb.

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Root Disease of Sugar-cane.

ROOT disease is probably the most important among the fungoid diseases of sugar-cane in the West Indies. It is fully described, with illustration, in 'Diseases of the Sugar-cane,' (Pamphlet 29 issued by the Imperial Department of Agriculture). The disease has been especially prevalent in Barbados during the past two seasons, when the weather conditions have been too dry to be favourable to a vigorous growth of the cane.

Root disease, caused by attack of the fungus *Marasmius Sacchari*, was first reported from Java in 1895. The same fungus was, some six or seven years later, recognized as being chiefly, if not entirely responsible for similar trouble in the West Indies. Root disease of the sugar-cane has also been described from Hawaii, and more recently from Louisiana.

It is evident, therefore, that this disease is widely spread throughout sugar-producing countries. The question of the best methods of combating attack is one of first importance, and is receiving considerable attention at the hands of both practical and scientific men.

As already mentioned, the sugar-cane crop of Barbados has suffered considerably from attack during the past two seasons, and in 1906 sugar planters in the Couva district of Trinidad reported the occurrence of a disease, which was causing considerable damage among their crops. Specimens were forwarded for examination to the Imperial Department of Agriculture, and it appeared that *M. Sacchari* was responsible for the greater portion of the damage noticed.

Root disease of the sugar-cane was some years ago very prevalent in Antigua, but the general opinion of planters of that island, as elicited by Dr. Watts in 1906, was that very little disease existed in the island at that time. Dr. Watts himself, however, is of opinion that the root fungus is more widely distributed than is generally imagined, and that the insidious nature of attack of the root fungus leads planters to overlook its existence except in bad cases. He points out that very often the crop may be seriously lessened by the presence of root fungus without any appreciable amount of dead cane being seen.

The symptoms of root disease are well known to most sugar planters in the West Indies. The shoots affected present a stunted appearance; the leaves are few in number and pale-green in colour, while the oldest leaves show a tendency to dry up from the apex and margin. The youngest leaves present infolding of the two halves of the blade, to prevent, as far as possible, undue loss of moisture by evaporation. It is characteristic of the disease, too, that the leaf bases at the foot of the cane are matted to the stem by a 'felt' of white mycelium.

Root disease tends to destroy the cane crop in two ways: it destroys the roots of plants and ratoons, and it also smothers the new shoots of ratoon stools.

Destruction of the roots is caused by the fungus entering and destroying the delicate cells that constitute the growing points. The growth of the root is stopped, and the available supply of water and minerals, etc. in solution, is therefore gradually reduced. The efforts made by the plant to replace the dead or dying roots by new tissue cause a constant drain upon its resources, with the result that the affected cane crop is, at the best, poor and light in character.

In addition, the matting of the white fungal mycelium undoubtedly smothers or seriously injures young ratoon shoots, and the loss entailed in this way is often very considerable. Young shoots which have died off, too, have sometimes been found to be penetrated in all directions by a fungus similar in appearance to that attacking the roots.

It may be pointed out that the *Marasmius Sacchari* can be distributed in three ways: (1) by spores borne by the toadstool-like fructifications, (2) by the mycelium that travels underground, and (3) by the planting of affected cane cuttings.

At the late West Indian Agricultural Conference, the whole question of root disease of the sugar-cane was discussed in a paper prepared by Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the staff of the Imperial Department of Agriculture. At the beginning of his paper Mr. Stockdale reviewed the advance of knowledge that had been made during the past ten or twelve years on the subject of root diseases of the sugar-cane. Stress was laid upon the importance of a more thorough adoption of remedial measures with a view of stamping out the disease.

The remedial and preventive measures recommended were divided into three classes: (1) cultural improvements, (2) sanitary measures, and (3) selection of varieties.

In view of the fact that a cane, growing vigorously under healthy conditions, is not likely to be seriously attacked by the fungus, the value of thorough and careful cultivation of the soil becomes at once apparent, since this tends to allow of good root development.

Ratoons are always much more badly affected by root disease than plant canes, and in fields where the trouble is especially noticeable, it may be better to give up ratooning altogether for a time.

The importance of good drainage was alluded to, and the question of rotation of crops fully discussed. Sometimes cotton can be grown on the affected land, and in this way a remunerative return can be obtained, at the same time resting the soil from sugar-cane.

Rotten canes and trash from land where the disease has recently appeared should never be made into pen manure, but should be destroyed.

The use of lime as a fungicide was also discussed by Mr. Stockdale, and the possibility that some of the good results attendant upon the use of lime in many sugar-producing countries might be due to its action on the parasitic enemies of the cane, rather than its indirect manurial action, was mentioned. The use of lime on sugar lands in Hawaii has recently been on the increase, and in Jamaica it has been shown that lime and cow peas form suitable treatment from a manurial point of view on many sugar-cane soils.

Another point of great importance in this connexion is the necessity of the greatest care being exercised not to plant cuttings from affected canes. If such cuttings are planted, they obviously serve as centres from which the disease is propagated. With suspected canes, or in planting on soils where disease is likely to occur, the cuttings may with advantage be soaked in Bordeaux mixture.

The disease-resisting qualities of many of the seedling canes were referred to by Mr. Stockdale, who reported that some progress had lately been made in breeding hybrid canes for disease resistance.

Finally it was mentioned that the adoption of the remedial and preventive measures described has had such excellent results in Java, where root disease of the sugar-cane was first noticed, that it is now stated to be difficult to find specimens of the fungus *Marasmius Sacchari* in the island. The system of rotation adopted, with elimination of ratoon crops, and the great care taken with material for planting purposes have been especially influential in bringing about this result.

SUGAR INDUSTRY.

Muscovado Molasses.

In a report recently presented to the Barbados General Agricultural Society by a Committee appointed to investigate the causes of souring in molasses, the following valuable information is given :—

From the results of a very thorough examination still going on at the Government Laboratory, the souring of molasses is concluded to be due chiefly to the production of acetic acid. This acid is produced in two stages. In the first stage alcohol is produced by the action of certain yeasts on some of the sugar of the molasses; in the second stage some of the alcohol is converted by a bacterium into acetic acid. The acetic acid then reacts upon certain substances in the molasses to liberate a proportion of other and unpleasant tasting acids to which the flavour is due. For the production of the alcohol from the sugar, other substances besides sugar must be present, and both the production of alcohol from sugar, and the production of the acetic acid from the alcohol may be prevented or delayed by the presence of certain substances in molasses whose nature is not understood.

It would appear that in muscovado molasses as ordinarily made, these last mentioned inhibitory substances are comparatively plentiful, while if the ordinary method of manufacture be deviated from, the amount of these substances may be insufficient to preserve the molasses under the ordinary conditions of handling.

Under the ordinary conditions of manufacture and handling, a certain number of the acidifying organisms must get in; but if the molasses is of the right composition, the souring will be slow or so slight as to be unnoticed. If the molasses is not of the right composition the souring will take place rapidly.

On the other hand, even with molasses of the right composition, if unusual contamination takes place as the result of want of cleanliness in the boiling house or puncheons, or through admixture with germ-laden molasses in town or in shipment, souring will take place.

From the above it will be noted that for fermentation and souring to take place, either the molasses must have an unusual composition, or the organisms (yeasts and bacteria) must be present in unusual quantities.

These facts supply the key to the problem as to how to preserve molasses. The answer is to keep the molasses of the ordinary muscovado composition so that it resists to a certain extent the attacks of the organisms, and to prevent as far as possible the presence of the organisms.

The first is accomplished by tempering and boiling the liquor in the ordinary way, particularly avoiding boiling too low. The second condition is attained by cleanliness and care in the handling of the molasses.

The points to be specially noted are :—

(1) Temper and boil the juice in the ordinary way and do not boil too low.

(2) Do not mix syrup with molasses.

(3) Be careful of the cleanliness of the gutters or pipes leading to the oscillators or coolers and from them to the centrifugals, and from the centrifugals to the molasses cistern. Avoid closed pipes as far as possible, as one cannot see inside them.

(4) Be careful of the cleanliness of the curing boxes when such are used. They ought periodically to be thoroughly cleaned and finally sterilized with a steam jet if possible, or rinsed with bisulphite of soda solution; or failing that, with weak milk of lime, and then dried with dry bags that have been washed.

(5) Be scrupulously careful about the condition of the molasses cistern and as far as possible of the stancheon. Avoid water leaks of all descriptions. If a cement cistern cracks, peck up the bottom all round the crack and replace with fresh, sound cement, etc. Clean out the molasses cistern as often as possible. Finish off with bisulphite of soda or milk of lime, and dry afterwards.

(6) Avoid second-hand puncheons or shooks, as they will probably be impregnated with the germs of fermentation.

(7) Pay great attention to the rinsing out of the puncheon before it is filled. It should be first drained, then rinsed out thoroughly with ordinary clean water. The best way of finishing the cleansing is to play on the interior with a steam jet and then drain or rinse out with boiling water, and drain. Failing these, rinse out finally with bisulphite of soda or thin milk of lime, and drain.

(8) If possible, it is desirable that out rods and sampling instruments should always be washed between one puncheon and the next. It is suggested that the ordinary out rods might be copied locally in pine so that each guager has 50 or 100 to work with, enabling them to be washed in batches.

(9) Filling up one puncheon from another and 'running' are undesirable wherever they can be avoided; chiefly because of the risk of infecting a good molasses with a bad one.

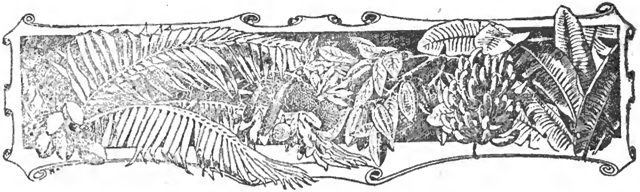
Sugar Industry in British Guiana.

The *Annual Report* (1906-7) on British Guiana makes the following reference to the sugar industry of the colony :—

The sugar crop for export amounted to 114,951 tons, as against 116,550 tons for the previous year. The total area in canes at the end of March, exclusive of land cultivated by cane farmers, was 74,426, as compared with 72,390 at the close of the previous year.

Work on the experimental cane cultivation at the Botanic Gardens under the charge of the Board of Agriculture continued during the year. Cultivation of the new varieties of canes on the sugar estates of the colony received still greater attention on the part of the planters generally, and the area occupied by these experiments increased from 20,000 acres in the previous year to 27,500 acres. Practically all the sugar estates of the colony continue to take part in this work.

The usual consolidated returns of the results of the experiments on the sugar estates undertaken on a manufacturing scale were published during the year. These returns indicate that a steady advance is maintained, and that new varieties produced in the colony and in Barbados, not only exceed the standard variety in yield of sugar per acre, but show greater resistance to drought and disease. These large scale experiments are being continually increased,



WEST INDIAN FRUIT.

CITRUS FRUITS IN CUBA.

At the first annual meeting (1907) of the Cuban National Horticultural Society, Mr. C. F. Austin read a paper dealing with the varieties of citrus fruits chiefly grown in Cuba. It was stated that inquiries had been made from most of the leading fruit growers in the island, and the information contained in the paper was compiled by Mr. Austin with the help of the answers received.

Most of the varieties of oranges grown in Florida have also been adopted in Cuba, and many of them are largely planted. Other kinds, however, are being raised as well, and in the course of his paper, Mr. Austin spoke in favour of the native Cuban oranges, which appear to be somewhat neglected by growers. It was mentioned that a collection of the native varieties was being made at the Experiment Station, with a view to testing their merits in comparison with the more popular Florida and other varieties.

Among oranges, Hart's Late appears to be the kind which is being most extensively planted in Cuba. The Pine-apple, Parson Brown, and Washington Navel varieties are also very popular. Hart's Late, as its name implies, is a late orange, as also is the Pine-apple, and both varieties can be recommended to the attention of growers who endeavour to meet the late season market. The flavour of both kinds is excellent, but it was mentioned by Mr. Austin that the Pine-apple is a variety which demands a good deal of attention in order to obtain the best results.

Parson Brown is an early orange with rather a poor flavour. It is a variety which needs care and attention, and it is probable that more profitable kinds could be raised, e.g., Boone's Early.

The Washington Navel orange is as yet in the experimental stage in Cuba. It is an early variety, prolific, and has a fine flavour, but doubts were expressed as to whether it was suitable to Cuba from the commercial point of view.

The Jaffa, Joppa, Valencia, and King varieties of oranges were all mentioned favourably in the course of Mr. Austin's paper. These are mid-season and late varieties. The Fancy Tangerine has also gained a very excellent reputation in Cuba. It is very prolific, has an excellent flavour, a fine colour, and can be grown almost to perfection when given due care. The Willow-leaved Mandarin, on the other hand, does not appear to be regarded so favourably.

As the result of his inquiries Mr. Austin learned that more or less of the following varieties of oranges have also been planted: Centennial, Enterprise, Homassa, and Medium Sweet.

Pomelows or shaddocks, lemons, and limes also receive a considerable amount of attention in Cuba. Among pomelows, the most popular kinds are those known as Walters,' and Marsh Seedless.

ORANGE GROWING IN NEW SOUTH WALES.

A correspondent from New South Wales, writing to the *Journal of the Society of Arts*, gives some account of the orange-growing industry in that colony.

A trial shipment of oranges was recently despatched from Sydney to England. The fruit arrived in a satisfactory state, although the prices obtained in this first instance did not leave any profit to the consignors. It is hoped, however, that the cost of transport may in future be reduced.

Orange growing is an extensive industry in the coastal districts of New South Wales, but up to the present the available markets have been limited to those of Australia and New Zealand. In successful plantations the cultivation is very thorough, the ground being periodically dug or ploughed, and afterwards well tilled and harrowed.

Bone-dust, which is obtained from the meat-preserving factories of the State, is the principal fertilizer used, but potash manures, superphosphate, and sulphate of ammonia are frequently applied by some orange growers, the soil being as a rule shallow and not rich in fertilizing constituents. It is stated, too, that mulchings of leaves and other vegetable refuse are found to give excellent results, and when available in sufficient quantity, satisfy all the manurial experiments of the orange plantation.

The Bahia and the Valencia Late form the most promising varieties of oranges grown. Owing to the suitable season of ripening, hopes are being entertained among growers that a market may be found for the latter variety in the United States.

The Government of New South Wales is endeavouring to encourage the orange industry by every means in its power, notably by experiments conducted on Government farms, and by the employment of experts as travelling lecturers and demonstrators in pruning, budding, and grafting.

It may be mentioned too, that the manufacture and export of marmalade, a subsidiary industry dependent upon orange cultivation, has latterly come into existence in New South Wales, and a market for this product has been found in South Africa and the far East.

CACAO EXPERIMENTS IN THE WEST INDIES.

The paper read by Mr. J. C. Moore at the late Agricultural Conference, giving an account of cacao experiments carried on at St. Lucia, is reproduced below, in continuation of other papers which appeared in the last number of the *Agricultural News* (Vol. VII, p. 53), dealing with cacao experiments in Grenada and St. Lucia. The paper read by Mr. Joseph Jones, on the subject of experiments in grafting cacao made at the Dominica Botanic Station, will be published in the next issue of the *Agricultural News.*

CACAO EXPERIMENTS IN ST. LUCIA.

In St. Lucia, three 1-acre cacao experiment plots, maintained by the Imperial Department of Agriculture, have successively demonstrated, in three of the principal cacao districts, the cultural and manurial treatment most likely to convert unfruitful, diseased, and neglected trees, into healthy and profitable ones.

On one plot the trees were old and neglected; the stems numbered about eight to the clump. It was described as the worst piece of cacao in the locality; but by judicious treatment, including thinning, pruning, shading, annual forking, weeding and burying weeds, draining and manuring, the productiveness of this plot was, in three years, increased from 56 lb. to 1,100 lb. of cured cacao.

The manures were applied during 1901, and consisted of 10 cwt. of basic slag, and $\frac{1}{2}$ cwt. of sulphate of potash in February, 5 cart-loads of pen manure in April, and 1 cwt. of sulphate of ammonia in July.

The cost of cultivation and manures during this period was £14 13*s*., and the value of the crops reached £45 10*s*.

The second plot consisted of seven-year-old trees in a diseased and failing condition, in the Soufrière district. The cultural operations consisted of thinning, pruning, forking, etc, as in the previously described plot.

The cost of cultivation and manures during these five years reached £37 7*s*. 4*d*., and the value of the crops produced was £64 17*s*.

The third plot, situated at Roseau, was a mixture of old and young trees (the latter about seven years old) in a neglected and dying condition.

The cost of cultivation and manures was £30 17*s*. 5*d*., and the value of the crops produced was £70 5*s*.

On another estate, not under the Department's supervision, similar cultural and manurial treatment on 38 acres of old cacao resulted in a net profit of £180 for nine months, over and above the average value of the crop reaped from the plantation before manuring was commenced. The benefit to the general health and bearing capacity of the trees is said to have increased their value by £500.

SUMMARY OF RESULTS.

From the results obtained on these and other plots in the island, the following conclusions may be drawn :—

1. That intensive culture in cacao is very profitable, as regards monetary returns. It also improves the vigour and disease-resisting power of the trees.

2. That on St. Lucia soils phosphates and nitrogen, in the form of basic slag and sulphate of ammonia, increase very considerably the productiveness of the trees.

3. That better results have been secured where pen manure or other suitable organic manure has been used in addition to basic slag and sulphate of ammonia.

4. That on most St. Lucia plantations efforts should be directed towards increasing and subsequently maintaining the supply of organic matter in the soil.

5. That the yield of cacao in St. Lucia from an estimated area of 6,200 acres, now giving, on an average, about 300 lb. of cured produce per acre, could be trebled by means of high cultivation, costing, on an average, from £5 to £6 per acre per annum. This means that from the present acreage, the cacao exports could, in four or five years' time, be raised from 9,500 bags (1905-6 crop) worth (at 6*d*. per lb.) £47,500, to 28,500 bags, worth £142,500. In addition to this, the value of the cacao properties would be greatly enhanced.

GROUND NUT CULTIVATION IN BURMA.

One of the most noticeable features in connexion with agriculture in Burma of late years is the remarkable extension in the area devoted to ground nut cultivation, a crop to the value of which attention has frequently been drawn in the *Agricultural News.* Extracts from an article in the *Tropical Agriculturist* of September last, dealing with this subject, are here reprinted :—

Until about six years ago ground nut cultivation was practically unknown in Burma, and where there was cultivation, it was insignificant and was mostly in the hands of Indian cultivators who had migrated to these shores. Within recent years however, the extension in the ground nut area has been extraordinarily rapid, the acreage having increased over twenty-fold in five years. The provincial area in acres during the past five years has been : 1902-3, 3,866 ; 1903-4, 11,731 ; 1904-5, 15,880 ; 1905-6, 37,110 ; and 1906-7, 78,743.

From an economic point of view *Arachis hypogaea* is of considerable importance, and it may be stated that few legumes can compare with it in the number of uses to which it can be put. From the seeds, a clear, straw-coloured, non-drying oil, having the taste of olive oil, is expressed, which is used in lieu of olive oil for alimentary and medicinal purposes. Further, in the manufacture of soap and as a lubricant, this oil is in great demand. Some sixty years ago the oil was unknown to European commerce, but at the present day the annual consumption may be safely computed at over 150,000 tons of prepared oil. The nuts are largely eaten by the natives of all classes, either shelled or roasted in oil; roasted in shell they serve as a dessert on European tables and are eaten with salt. Hand-shelled nuts are also made into confectionery, and the roasted seeds are often used as a substitute for chocolate.

The dried plants and leaves serve as a excellent fodder for the cattle, the hay being very nutritious, greatly increasing the milk of cows. From the refuse of the shells after the extraction of the oil, a cake is also made which has a high reputation as a nourishing cattle food. Besides, the plant is eminently useful as a source of green manure, since, in common with other leguminous plants, it has the power of fixing free nitrogen from the atmosphere into the soil. Analysis has shown that the roots, leaves, and stems contain about 0·914 per cent. of nitrogen. On account of this property, and also because of its influence upon the mechanical texture of the soil, drainable paddy land, which has become exhausted, can be made to produce further crops of paddy if ground nuts are grown as a rotation crop. After the harvest, the plants can be ploughed in as green manure, and paddy grown on such soil usually produces a double crop.

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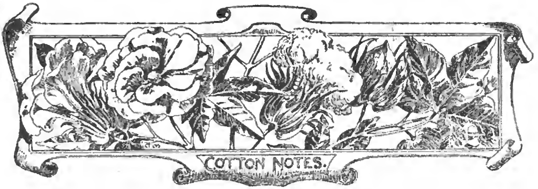
COTTON NOTES.

SEA ISLAND COTTON MARKET.

Messrs. Henry W. Frost & Co., of Charleston, write as follows on February 8, in reference to the sales of Sea Island cotton:—

> The market was quiet and unchanged throughout the week, with the sale of only one crop lot of 15 bales for France. Factors are showing more disposition to sell, and with orders in hand, we think we could buy at some concession.

On February 15, Messrs. Frost write:—

> In the absence of any demand the market remains quiet and nominally unchanged. Factors are anxious to dispose of their remaining stocks, and to effect sales would be willing to make considerable concessions from their asking prices. We give the accompanying quotations, which in the absence of demand are nominal: fully fine to extra fine, 38c. to 40c.; fine. 35c.; fine to fully fine, but tinged and stained, 22c. to 25c.

COTTON CULTIVATION IN ST. LUCIA.

The accompanying particulars, gathered from a brief article in a recent number of the *Voice of St Lucia*, indicate the increasing interest that is being taken in cotton cultivation in that island.

On February 9 last, a meeting was held at the Roman Catholic School of Choiseul parish to discuss the prospects of cotton planting in St. Lucia. A large audience was present, and an address on the subject was given by Mr. John Salmon.

The speaker referred to the action of Messrs. Macfarlane, Junior & Co. in introducing the cotton industry by planting the Balembouche estate with the crop, and by the establishment of a central ginnery at Castries. The proprietors of the factory were willing to purchase all the Sea Island seed-cotton brought to them, and they meant to pay prices that would make it worth while for the small planters to go in for the cultivation, which, he could assure them, was one that would give good returns for intelligent work. Messrs. Macfarlane would supply seed free, and sell cheap manures and insecticides to those who were willing to undertake to sell their cotton to the firm.

Meetings to consider the subject of cotton planting are being arranged for at Micoud and Dennery, where the hearty co-operation of the clergy has been assured, and it is reported, too, that attempts are being made to arouse interest in the industry in the Gros Islet district, where there is much land now lying unproductive, but very suitable for the production of cotton.

A special general meeting of the Agricultural Society of St. Lucia was summoned for February 28 last, to discuss the cultivation of Sea Island cotton in the island.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date February 17, with reference to the sales of West Indian Sea Island cotton:—

> The market for Sea Island cotton has been depressed since our last report. The fine spinning trade is very unsatisfactory, and unless they can sell yarn, spinners will not buy cotton, as they still hold large stocks from last season. The sales of West Indies include about 110 bales of St. Vincent, 19*d.* to 23*d.*; 50 bales Barbados, 18¼*d.* to 19*d.*; 30 bales St. Kitt's, 18½*d.* to 20*d.*; and 50 bales Montserrat, 18*d.* to 18½. Quotations are reduced 1*d.* per lb., and are still quite nominal.

CATCH CROPS WITH COTTON.

The *Report* for 1906-7 on the work of the British Cotton-growing Association in West Africa contains a large amount of information with regard to the results so far obtained with the different varieties of cotton tested, methods of cultivation, etc. In Nigeria trials are being made with a view to the establishment of a definite rotation of crops, cotton being the chief, and such products as maize, yams, ground nuts, and pigeon peas being planted as catch crops.

The following paragraph is reproduced from the report:—

> The ground nut is another catch crop, and is far more valuable than maize, both on account of its fertilizing qualities, and its higher commercial value. Ground nuts do not rob the land of its fertility, but improve it, on account of the property shared by all leguminous plants, of assimilating nitrogen from the atmosphere, and storing it up in the soil, where it becomes available for the following crop.
>
> If after gathering the ground nuts the dead vines are dug into the soil, this latter will be further improved by the addition of organic matter or humus.
>
> Ground nuts need somewhat more careful cultivation than corn, but their higher commercial value more than pays for the extra labour expended on them.
>
> In growing ground nuts as a paying catch crop before planting cotton on the land, there is always the danger that they may become fully ripe before it is time to plant the land with cotton. The rains at the beginning of the rainy season may set in too late, or a drought during the growing season may retard their ripening. In either case the nuts would be valueless from a commercial point of view, but would greatly increase the fertility of the soil.

COTTON INDUSTRY IN MONTSERRAT.

Mr. W. Robson, Curator of the Montserrat Botanic Station, writes as follows to the Imperial Commissioner of Agriculture, under date of February 19 last, with reference to the present season's cotton crop of the island:—

The total shipments of cotton to date amount to 216,313 lb., of an estimated value of £16,218, so that it is likely that the average return per acre will exceed considerably that of last year, which was 160 lb. of lint per acre, over 1,000 acres.

On good land an appreciable second crop will be obtained, especially on many of the peasants' plots, where the cotton is grown under garden conditions.

I am not able to state what prices were received for the first shipments.

St. KITT'S AGRICULTURAL AND INDUSTRIAL SHOW.

Mr. F. R. Shepherd, Agricultural Superintendent of St. Kitt's-Nevis, has forwarded an account of the Agricultural and Industrial show, held at St. Kitt's on February 13 last, from which it appears that the meeting was a very successful one in every way.

The show was opened by his Excellency the Governor of the Leeward Islands (Sir Bickham Sweet-Escott, K.C.M.G.), who, in his speech, congratulated the Society on the quantity and quality of the exhibits. He referred to the presence at the exhibition of Mr. W. G. Parmalee, Deputy Minister of Trade and Commerce of Canada, who could see, from the numerous exhibits, that St. Kitt's-Nevis was capable of producing other products than sugar. Sir Bickham also alluded to the great value of the West Indian sugar trade with Canada, and pointed out the importance of doing everything possible to strengthen trade relations between the Leeward Islands and the Dominion.

In referring to the good work of the Imperial Department of Agriculture in the Leeward Islands, his Excellency regretted the absence of Sir Daniel Morris, who was unable to be present that day. A telegram, however, had just been received from the Imperial Commissioner of Agriculture in which he sent his best wishes for the success of the show.

The exhibits were more numerous and of better quality than last year, this being especially the case with the vegetables and sugar-canes on view. Nevis came well to the front: exhibits of yams, maize, and a stool of plant canes from that island all being awarded first prizes, while the Governor's prize for the best collection of vegetables also went to a Nevis exhibitor.

The horned stock, goats and sheep, as well as the poultry, formed good classes, many of them showing distinct advances as compared with past years.

As regards school exhibits, the Roman Catholic school, and the Wesleyan school, Basseterre, sent creditable collections of pot plants, etc., while four schools sent collections of vegetables.

Two bales of broom corn were shown, one from Pinney's, Nevis, which was awarded first prize, and the other from Brighton estate.

A separate exhibit was arranged for the Botanic Station, on which was displayed all the different products grown at the station and at La Guerite.

SUCCESS OF IRRIGATION METHODS IN INDIA.

The success that has attended efforts to develop agriculture in a portion of British India by means of irrigation is thus described by the U.S. Consul at Calcutta:—

The Chenab canal system was opened in 1887, and waters nearly 2,000,000 acres of land that was comparatively worthless before brought under irrigation, but which is now rated at an average of $50 per acre. The Chenab colony is now one of the most prosperous in all India. It has no fears hanging over it as to the outcome of crops on account of uncertain rainfall, and the result is that the people comprising the colony are happy and contented. Before the canal was opened and the colonization scheme carried out to any degree of success, the land was practically a desert country occupied by a few people engaged principally in raising goats and breeding camels. When the grazing was fairly good by reason of sufficient rainfall, the population increased and the animals did very well. But when the drought was on (which was the case most of the time), the herdsmen moved their herds to a more favoured locality. Now all this is changed. The Chenab canal has converted the desert into a garden, and the people living there have plenty and to spare.

PROSPERITY OF DOMINICA.

The increasing prosperity of Dominica is evident from the facts and figures brought forward in the course of an address delivered by the Administrator of the island (Hon. W. Douglas Young) at a meeting of the Legislative Council on February 13 last. The following notes are taken from Mr. Young's address:—

In 1906 the trade of Dominica reached the unprecedented value of £209,470. During the past year (1907) this prosperous state of the island was maintained, and the value of the trade advanced to £252,943.

The imports of the island for 1907 reach the figure of £115,297, an increase of over £22,000 over the previous year, while the value of the exports totalled £118,701, an advance of £23,000 on those of 1906.

The output of the lime industry during 1907 was most marked. The lime crop of the year was the largest ever reaped in Dominica, and was estimated at 245,000 barrels, an increase of 28,000 barrels over the crop of 1906.

Concentrated lime juice formed the chief exported product of the lime industry, the increased value of the shipments of this article being £11,000 as compared with those of the previous year.

The trade in raw lime juice, citrate of lime, and green limes has also shown advance during 1907. The total value of the exports of the lime industry during 1906 was £54,874, and those for the year 1907 were valued at £77,407, this latter figure representing 65 per cent. of those exports which are the produce and manufacture of the island.

There was a small increase in the amount of cacao shipped from Dominica during 1907 as compared with 1906. In the latter year, 11,380 cwt. of cacao were exported, while in 1907 the figure was 11,628 cwt. In 1906 the value of the exports was £35,185. Owing to the higher average price of cacao in 1907, however, the value of the year's exports of the crop is placed at £49,000. Some sales of Dominica cacao in the London market during the year fetched as much as 120s. per cwt.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

Root disease of the sugar-cane receives attention in the editorial of the present issue of the *Agricultural News.* Remedial and preventive measures are discussed.

Useful information in relation to the causes of souring of muscovado molasses appears on page 67. There is also a note on the sugar industry in British Guiana.

The varieties of citrus fruits that have given the most satisfactory results in Cuba are mentioned on page 68, where also will be found a brief article on the orange growing industry in New South Wales.

An account of the cacao experiments in progress at St. Lucia is given on page 69.

The Cotton Notes of the present issue include market reports, together with other brief articles of interest.

A successful Agricultural Show was held at St. Kitt's on February 13 last (page 71).

An interesting article in regard to nutmeg cultivationwill be found on page 75.

Sisal cultivation in the Caicos Islands has undergone rapid extension during the past few years, and is now a valuable industry (page 79).

Trinidad Cacao Exports.

Cacao growers in Trinidad are certainly experiencing a favourable season and good returns for their produce, and even if prices drop somewhat before the whole of the crop has been gathered in, the increased output as compared with last year should go far to make ample compensation to producers.

During 1907, a total of 251,755 bags of cacao were shipped from Trinidad, of which 134,611 went to Europe, 114,749 to New York, and 2,388 bags to Canada. In January 1907, the amount of cacao shipped was 16,308 bags, while during the corresponding month of 1908, the exports reached 46,139 bags, or very nearly treble the output for January of the previous year.

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Agaves and Soil Denudation.

An excellent example of the use of vegetation in arresting soil denudation is reported from South Africa, where removal of the soil through the agencies of burning, excessive trampling, torrential rain, etc. causes much trouble on the bare lands of the veldt. It is stated, however, that a good deal of success has attended efforts made to combat this evil by planting the American 'Aloe' [probably *Agave americana*] on affected areas.

An effective barrier is formed to the denuding effects of torrential rain by the establishment of lines of these plants across sloping lands, and since the sediment washed down is stopped by the barrier, periodical terraces tend to become formed on the hillside in the course of a few years.

Further, shelter is provided for other plants which grow up below the lines and form an additional mass of vegetation, while the young succulent leaves of the agave afford a supply of palatable food for stock during dry seasons.

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Rubber in British Guiana.

The possibilities of the rubber industry in British Guiana are mentioned very favourably in the *Report* for 1906-7 of the Lands and Mines Department of that colony.

Reference is made to the fact that indigenous rubber trees, notably *Sapium Jenmani* are growing luxuriantly in the lower reaches of all the rivers in the North West District, as well as on the banks and islands of the Essequebo river, and the Commissioner of Lands and Mines is strongly of opinion that rubber cultivation in the colony should receive every encouragement. The low, flat, alluvial banks of the river are especially adapted for the growth of the native species of *Sapium,* and thousands of acres of this land might be utilized in the cultivation.

The terms on which land is leased for rubber-planting purposes by the Government of British Guiana were summarized in the *Agricultural News,* (Vol. VI, p. 409), and they are certainly favourable enough to encourage men of means to test the rubber-producing possibilities of the colony.

During the year 1906-7, 2,563 lb. of rubber, and 634,222 lb. of balata were exported from British Guiana.

Cacao Pests of Trinidad.

Acknowledgement must be made of the receipt of copies of Mr. O. W. Barrett's report on fungus diseases and insect pests affecting cacao trees in Trinidad. This report has been issued as *Society Paper No. 280* of the Agricultural Society of Trinidad and Tobago, and in addition to information dealing specially with the insect and fungus enemies of cacao, it contains also hints and suggestions in reference to treatment of the soil, cover crops, shade, windbelts, pruning, etc., as well as notes on miscellaneous crops.

A review of Mr. Barrett's report will shortly appear in the *Agricultural News*.

◆

Cassava Refuse as Stock Food.

Dealing with the cassava experiments that are in progress in Jamaica, the Island Chemist (Hon H. H. Cousins, M. A.) mentions that trials are being made as to the possibility of converting the cassava refuse ('bitty') after starch manufacture into a useful feeding meal for cattle. The bitty is first dried, and then mixed with one-third its weight of guango pods.

The results already obtained indicate that such a mixture is easily prepared, that it possesses a good flavour, and a high nutritive value for cattle, pigs, and other stock.

Many scores of tons of guango pods rot and waste annually in St. Catherine parish that might be utilized in this way.

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Plant Acclimatization Work in India.

Acclimatization work with large numbers of exotic plants has for many years past been carried on at the Saharanpur Botanic Gardens in India. Saharanpur is the western district of the United Provinces. The altitude of the Botanic Gardens is 903 feet; the average rainfall is about 37 inches, and the mean temperature a little over 70° F. The maximum shade temperature, however, reaches 105° F., while in the winter the thermometer may fall as low as 22° F.

A report has lately been compiled by the Superintendent of the Gardens giving an account of all the trials that have been made with various plants. Mention is made of the results obtained with many trees and plants well known in the West Indies. The alligator apple (*Anona palustris*, Linn.), a native of Jamaica, grew well under shelter, but died when exposed to the cold of winter. The climatic conditions seemed to suit the jalap plant (*Ipomoea* (*Exogonium*) *Purga*), but a promising crop was destroyed by a fungoid disease. Guinea grass (*Panicum maximum*, Jacq.), introduced into India from Jamaica, did well, and gave good results.

The Mammee apple (*Mammea americana*, Linn.) stands the cold of winter well. Plants set out twenty years ago have developed into handsome trees, 15 feet high. So far, however, they have not fruited.

The Avocado pear (*Persea gratissima*), first planted twenty-five years ago, has done fairly well, and borne a few fruits. It has apparently suffered more from excessive heat than from cold. A more equable climate is required for this tree. The sapodilla (*Achras sapota*) has grown to a handsome tree; it flowers every year, but has not yet fruited. The Jamaica shade tree (*Pithecolobium Saman*), on the other hand, ha sbeen utterly killed out by frost.

Both the quassia tree (*Quassia amara*) and the Lignum vitae (*Guiacum officinale*) did well under shelter, but would not grow in the open.

◆

Improved Breeds of Goats and Sheep.

A good deal of interest is being taken by peasants and others in the improved breeds of goats and sheep now being raised as the result of the introduction of selected rams from various parts of the world by the Imperial Department of Agriculture. The improved breeds of goats are of the Toggenburg, Anglo-Nubian, and Punjab sorts. The sheep are of the woolless kind described in the *West Indian Bulletin* (Vol. VI, p. 187). Latterly four fine rams of this breed have been obtained, at considerale cost, from Lagos, West Africa. One of these rams measures 33½ inches at the shoulder and weighs 140 lb.

With the view of assisting those who may wish to obtain kids or lambs of the above breeds, arrangements have been made with Messrs. Garraway & Co., of Barbados, to act as Agents for the Department, and this firm will receive applications, and ship animals when available, at reasonable rates.

It is desired that correspondence on this subject be addressed to Messrs. Garraway & Co., and not to the Imperial Department of Agriculture.

◆

Agricultural Industries of British Honduras.

The British Honduras *Annual Report* (1906) indicates that the timber trade still holds the premier position among the industries of the colony. In fact, the mahogany exports are greater than in any previous year, having a value of $584,598 as compared with $549,099 in 1905. The shipments of logwood show a decline, while those of cedar are practically stationary.

The year 1905 is mentioned as having been an excellent one for fruit, but still better returns were obtained in 1906. Bananas, plantains, and cocoa-nuts are the chief fruits grown. The value of the banana exports increased from $142,925 in 1905 to $181,250 in 1906. Plantains also were shipped in greater quantity, and cocoa-nuts were exported to the value of $83,077 as compared with $74,804 in 1905.

This enhanced value of the fruit trade has been continuous for several years past. It indicates that the inhabitants of the colony are paying more attention to agriculture proper, instead of devoting all their energies to wood-cutting.

It is stated that forty-nine sugar mills are in operation in the colony, seven of which are worked by steam. About 700 tons of sugar are annually produced, and nearly the whole of this quantity is consumed locally.

Attention has been given to rubber planting in British Honduras, and during the year 22,108 lb. of rubber, having a value of $18,362, were exported.

RUBBER PLANTING WITH INTERCROPS AND CATCH CROPS.

The progress of the rubber industry in its various phases during 1907, is discussed at considerable length in a special article in the *India Rubber Journal* of January 27 last. The writer is of opinion that the recent fall in the price of rubber will have a wholesome effect in stimulating production, since manufacturers complain that excessive prices prohibit the use of rubber to anything like the extent in which it would be employed if the cost were somewhat lower. Even with considerably reduced prices, it is anticipated that Para (*Hevea brasiliensis*) and Castilloa (*Castilloa elastica*) rubber cultivation would still return handsome profits.

Questions relating to methods of cultivation are discussed, and the following paragraphs relating to distances in planting, and the use of intercrops and catch crops, may be quoted from the article:—

The method of cultivating rubber trees may appear very simple, and as one unlikely to show many changes during a year. Planters are, however, gaining more opportunities of judging the requirements of Para rubber trees at different ages, and the past year has seen changes in two directions in the planting programme of new concerns.

In the first place the distance adopted in planting has been increased; instead of planting the trees 10, 12, or 15 feet apart as in previous years, a minimum distance of 15 × 20, or 20 × 20 feet has more often than not been adopted. Following on this change it is obvious that a much larger area of soil is exposed to sun and rain, and the necessity for weeding therefore has been proportionately increased; in order to meet these objections the use of temporary catch crops, to last six to eighteen months, or even as long as three years, and of more or less permanent intercrops, to last twenty years or more, has been extended.

The advisability or otherwise of devoting all efforts to the cultivation of rubber-yielding plants alone, on a rubber estate, has frequently been discussed. In the wild state most varieties of rubber-yielding trees grow naturally mixed with other forest trees. Some of the rubber trees offer, by means of their branches and foliage, an adequate shade for other plants, whilst others again appear themselves to require the shade of more gigantic forest forms. Under cultivation, this natural condition is being entirely overlooked, rubber trees—more often than not—being grown alone; but we have no proof that such a state will be the best in the long run. It has been shown that, on young plantations where the soil is packed with decaying roots of old and large trees, the cultivation of bananas and other rapidly-growing plants is sometimes beneficial, in so far as these plants assist in the more rapid decomposition of tree root structures, which, if allowed their own time, might serve as the basis for the origin of diseases injurious to Para rubber plants. In this respect we need only refer to root fungi and white ants to emphasize the importance of using other crops on the same land.

We are fully aware that, at the best, the cultivation of catch crops does not give the same freedom to the roots of a rubber tree as does the exclusive cultivation of rubber plants, but we are inclined to think that though the growth of the rubber trees may be a little retarded, the investment is a safer or more permanent one. We still think that it would be a great advantage to adopt a distance in planting which would allow of the permanent cultivation of other intercrops; we regard the combination of cacao and rubber, or even coffee and tea in conjunction with rubber, as a very suitable method of developing a tropical plantation. The life of such intercrops is mainly determined by the distance apart the rubber trees are planted, and we hope before long to see rubber planters taking a greater interest in the growing of intercrops on their rubber plantations.

COFFEE PRODUCTION IN BRAZIL.

The effect of improved cultural methods upon coffee production in Brazil is evident from a consideration of the latest report of the U.S. Consul-General at Rio de Janeiro, from which the accompanying interesting extract has been made:—

While undue consideration of the possible size of future coffee crops in Brazil is more or less speculative, there are one or two facts which should be taken into consideration by coffee men the world over as having a permanent bearing upon the coffee supply of the world. After the experience, following the previous record crop of 1901-2, Brazilian governmental authorities considered that there was an over-production of the berry, and proposed to prevent such over-production by means of legislation prohibiting the planting of more coffee trees and the extension of coffee acreage generally. While this legislation was not as general and as effective as it was planned, there was enough done in this direction to prevent the further extension of coffee estates in the chief coffee-producing centres of the country.

The result was that, instead of extending their estates, the coffee planters threw the energy which they would have expended in such extensions, into the improvement of the coffee areas already planted. Old and broken trees were grubbed out, and young and vigorous trees were planted in their stead. What before had been more or less ineffective culture became intensive culture—in some places intensive culture of the most pronounced sort.

The result is that the production of coffee has been increased more generally, more uniformly, and probably more regularly from year to year than it would have been had estates been extended and cultivation continued under old methods. Trees planted to take the places of the discarded ones are now coming into full bearing. Improved methods of culture have produced more coffee, and generally better coffee from the same trees.

DEPARTMENT NEWS.

The Imperial Commissioner of Agriculture left Barbados on Wednesday, March 4, by the C.L.S. 'Dahome' on an official visit to St. Lucia. Sir Daniel Morris may possibly return to Barbados by the inter-colonial mail steamer on the 10th instant.

Mr. H. A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, returned to Barbados on February 25, and left again for Antigua by the R.M.S. 'Eden' on March 3, in order to continue his investigations of the insect pests affecting cotton in that Presidency.

NUTMEG CULTIVATION.

The *Tropical Agriculturist* of August last contained an interesting article in relation to the nutmeg and its cultivation, from which a few extracts are given below. In the West Indies nutmeg cultivation is carried on principally in Grenada: the exports from that island in 1906 were 8,166 cwt., of the value of £24,941.

The mace of commerce, it may be mentioned, is produced from the same fruit as the nutmeg, the former being a loose coat of tissue (known botanically as the aril) within the external fleshy portion, but surrounding the nutmeg or kernel of the fruit.

To quote from the article in the *Tropical Agriculturist*:—

The nutmeg tree belongs to the genus *Myristica*, of which there are several species, those cultivated in the East being *Myristica moschata*, *M. officinalis*, and *M. fragrans*. The tree usually attains a height of about 25 to 30 feet.

The seed, which is enveloped by the mace, has a hard outer shell, and within is the well-known nutmeg of commerce. The fresh mace is of a bright dark-crimson colour, which gradually changes as it dries, and becomes golden-yellow. It is aromatic, and, like the fresh nutmeg, contains essential oil. The fixed oil is extracted by pressure, forming a substance called 'butter of mace'; while the volatile oil is obtained by distillation. Mace contains about 7 to 9 per cent of oil, and about 23 per cent. of aromatic balm.

The nutmeg tree bears unisexual flowers, the male blossoms being on one tree and the female on another. In the wild nutmeg woods there is naturally about one male tree to every twelve or fourteen female, or bearing trees. In plantations where the trees are 20 to 30 feet apart, one male tree is required for every ten females, but as the sex of the tree cannot be told until the tree flowers, which is at about four or five years old, the proportions of the trees cannot be exactly gauged.

Nutmeg trees may be planted along with cacao, and in Ceylon they are found also as avenues and shelter belts on some tea estates. In the West Indies, bananas and cassava, etc., are planted as intercrops. The shade in the plantations is dense, so that there is no expense in weeding, etc. Indeed, the cultivation expenses, once the tree is up, are almost nil. The plant requires a rich, well drained soil, and a rainfall of 75 to 90 inches, a tropical climate, and shelter from strong wind. The young seedlings may be raised in nursery beds before planting out, but the method of sowing at stake in plantations is generally being adopted, and is said to give earlier bearing plants.

Beginning to yield fruit at five to eight years of age, the trees go on increasing in yield until they reach full bearing at the age of about twenty to twenty-five years, and then continue in full fruiting condition for very many years.

Flowering and fruiting of the nutmeg tree continues more or less throughout the year, but the heaviest crop comes on about July or August. When ripe, the fruit bursts, and must be carefully gathered, since it is easily injured and this depreciates its value.

On gathering, the fruits are sorted and then cured. The curing process takes some weeks to complete, and must be carefully done, the nuts being frequently turned. If exposed to too great heat, the essential oil of the nutmeg is lost. The most favourable temperature is from 95° to 104° F. A temperature over 112° is considered injurious. When the fruit is dry, the nut rattles inside, and then it may be cracked, and the mace separated.

Sorting, liming, and packing follow the curing process. The nutmegs are sorted according to size and appearance, and are rubbed with dry lime as a protection against worms and weevils.

The mace is dried, and afterwards packed for shipment. Care must be taken to prevent the growth of mould, and also to maintain the light or orange colour of the product.

AGRICULTURE IN BRITISH GUIANA.

The following particulars in regard to the agricultural industries, other than sugar, of British Guiana, are given in the *Annual Report* (1906-7) on the colony:—

The area under cultivation in rice increased from 23,853 acres to 26,568 acres, and the estimated rice crop from 442,860 bags (of 120 lb. each) of paddy to 756,400 bags. Further importation of varieties of paddy from Ceylon was made by the Board of Agriculture. These are being cultivated experimentally in a manner similar to that adopted for varieties of sugar-cane. About 4 acres are occupied with these experiments.

The area returned as under cacao is 1,760 acres. The exports of this product amounted to 50,033 lb. during the year, while that of 1905-6 was 57,097 lb. A large proportion of cacao produced in the colony is utilized in the local manufacture of chocolate.

Coffee is cultivated over 1,460 acres in British Guiana. The produce is all used locally, and there is practically no export trade.

About 6,700 acres are estimated as being occupied by cocoa-nut palms, and during the year under review, cocoa-nuts to the number of 49,900, and having a value of £149, were exported. By far the greater part of the crop of cocoa-nuts is used locally in the manufacture of oil and fibre.

The area under cotton cultivation shows a decrease from 17 acres in the previous year to 10 acres. The lint exports amounted to 303 lb., valued at £11.

Plantains and bananas cover 17,800 acres, and practically the whole production is consumed locally.

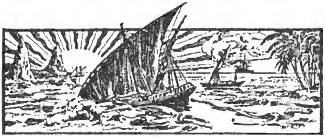
The returns show that there are 85,000 cattle in the colony; and 1,389 cattle, valued at £6,652 were exported during the year, as against the 1,588 head, valued at £7,074, of the preceding year. The Board of Agriculture continues to introduce pure-bred bulls of suitable kinds in the hope of improving the class of cattle raised on the pastures. The number of horses shown is 2,420.

There are, according to the returns, about 24,500 sheep, 15,500 goats, and 15,650 swine in the country districts. The number of these animals exported in 1906-7 was 752, valued at £454, as against 743, valued at £392, in 1905-6.

The Board of Agriculture continues to devote its attention to the promotion of agricultural work in the colony in several directions.

In addition to the very extensive experiments with sugar-canes, attention has been devoted to the encouragement of the cultivation of many other tropical agricultural and horticultural products, which can be raised in the colony, more especially rice, cacao, and rubber.

As a means of interesting the people in the production of agricultural and horticultural products, the Board has encouraged the holding of small local shows and country agricultural exhibitions. Two were held during the year with fair success. Farmers' competitions have also been held and have been attended by much interest on the part of the small cultivators.



GLEANINGS.

The first shipment of St. Vincent Sea Island cotton for the season sold at prices ranging from 22½*d.* to 25*d.*

The prices at the opening for the season of the Barbados sugar market were $1·75 per 100 lb. of muscavado sugar, 11c. per gallon for choice molasses, and 12c. for fancy molasses.

An outbreak of anthrax in Guadeloupe was reported some weeks ago, and the Government of the colony has prescribed measures with a view to stamping out the disease.

At the Experiment Station, Tortola, Virgin Islands, nearly an acre is under pine apples. The variety grown is Black Antigua, and the *Annual Report* on the station states that the plants are doing well and fruiting freely.

The apiary at the St. Lucia Agricultural School gave excellent results during the year 1906-7. A shipment of 983 lb. of honey was made to London, which realized the excellent price of 29*s.* per cwt., or a total of £9 3*s.*

A rainfall of 81·84 inches was registered at the St. Lucia Botanic Station in 1906-7. This was 9·20 inches higher than the rainfall of 1905-6, but considerably below the average for the seventeen previous years.

The Government of Queensland has offered a reward of £10,000 for the discovery of an effective method of destroying prickly pear (*Opuntia* spp.). The cost must not exceed 35*s.* per acre for scrub land, and 20*s.* per acre for forest land.

Some 9,000 cuttings of cassava and 5,900 cuttings of sweet potatos were, during 1906-7, distributed free to planters and small holders, from the St. Kitt's-Nevis Botanic Station, with a view to improving the quality grown.

At the present time there are five plots of cacao in Tortola, all of which have been established during the past few years. Two of these plots contain over 1,000 trees each, and are now coming into bearing. (*Virgin Islands Experiment Station Report, 1906-7.*)

A late number of the *Farmer and Stockbreeder* contained an article dealing with the fallacy of the popular idea that brown eggs are richer and better flavoured than white eggs. Chemical analysis shows that there is no difference whatever in the composition of white eggs and of brown eggs.

Thirty pounds of onion seed were imported from Teneriffe into St. Kitt's-Nevis during 1906-7 through the Imperial Department of Agriculture. This was sold locally at cost price, but the interest now taken in cotton tends to discourage any extension of onion planting.

Balata forms one of the natural products of Dutch Guiana, and the quantity collected during 1906 was 297 tons. High prices have recently been obtained, and there has been a large extension of the area undergoing exploitation for this product. (British *Consular Report.*)

The largest shipment on record of cacao from Grenada was recently made, when the *Crown of Granada* took 14,858 bags (about 24,000 cwt.) on board for the European market. Limits of space alone prevented even a larger shipment being made. (*Grenada Chronicle.*)

The Government of Queensland is reported to be about to adopt measures to encourage the systematic breeding of mules in the colony. So far little has been done in that direction in Australia. South America has 7,000,000 mules, Europe 1,488,000, the United States 3,600,000, Mexico 335,000, and Australia only 1,000 mules.

The English thorough-bred stallion 'Beau 2nd' will stand for service at the Stock Farm, Agricultural School, St. Vincent, until further notice. Fee 10*s.*, attendant, 2*s.* The fee for the services of the Ayrshire bull, 'Duke of Truro,' has, in the case of bona fide peasants, been reduced to 2*s.* per cow until the end of May next.

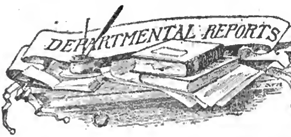
Mangabeira rubber, the product of a small tree, *Hancornia speciosa*, Gomez, was exported from Santos, Brazil, in 1906, to the quantity of 194,777 lb. This shows a slight decrease as compared with the exports of 1905, but a recent report dealing with the trade of Santos during the first three months of 1907, states that the exports of this commodity show a large increase over those for the corresponding period of 1906.

In an article in the *Farmer and Stockbreeder*, buyers of basic slag are strongly advised to insist on a guarantee as to the three following points in connexion with their purchase: (1) the total percentage of phosphate of lime in the slag; (2) the percentage of phosphate of lime soluble in a 2-per cent. solution of citric acid; (3) fineness of grinding.

Blocks of cedar and rubber, both of which are highly remunerative, are being planted by many owners in the Tacarigua district of Trinidad, where formerly cacao was grown to the exclusion of almost every other product. Cane farming, too, has undergone extension during recent years, there being now 2,300 acres under farmer-grown cane in the Tacarigua and Blanchissense Ward Union. (*Ward Union Reports*, 1906-7.)

The Warden of Oropuche and La Brea in Trinidad, states that coffee and rice cultivations receive little attention in his Ward Union. Cocoa-nut cultivation is also on the decline, in spite of good prices. The sugar-cane has barely held its own during the past year, cacao receiving first attention on all hands wherever it can be grown. The cacao area in the Oropuche and La Brea Ward Union is stated to be not less than 10,000 acres.

The influence of carbon dioxide at high pressure in destroying bacterial life is commented upon by the *Gardeners' Chronicle*, which describes some interesting experiments carried out at the New York Agricultural Station. Milk which had first been pasteurised, then charged with carbon dioxide at a pressure of 150 lb. to the square inch and run into ordinary siphons was found to be perfectly good at the end of forty weeks. Ordinary (unpasteurised) milk, charged in the same way, kept good for several weeks.



ST. KITT'S-NEVIS: REPORTS ON THE BOTANIC STATION, ECONOMIC EXPERIMENTS, AND AGRICULTURAL EDUCATION, 1906-7.

In common with other reports dealing with the work, during 1906-7, of the various Botanic and Experiment Stations under the supervision of the Imperial Department of Agriculture, that relating to St. Kitt's-Nevis opens with a short historical account of the establishment of the Botanic Station. This is followed by a summary of the work of the Imperial Department of Agriculture in St. Kitt's-Nevis during the period 1898 to 1907. The interest of the report is enhanced by the inclusion of eight photographic illustrations.

In addition to the Botanic Station at St. Kitt's a small branch station was started at Nevis in 1903. In the following year this was placed under the charge of an officer who also acted as Agricultural Instructor for Nevis.

Experiment plots on which trials are made in the cultivation of food-producing and other crops were established at La Guerite in 1901. The best varieties of sweet potatos, cassava, yams, onions, Guinea corn, tobacco, etc., have been planted, and cuttings or seeds of these plants have been distributed among planters and small growers with a view to improving the quality of the crops grown in the presidency.

The question of agricultural education in St. Kitt's-Nevis has received considerable attention from the Imperial Department of Agriculture. Courses of lectures on the principles of agriculture have been given to teachers in elementary schools by Dr. Francis Watts, C.M.G, and Mr. John Belling, B. Sc. By the provision of an Agricultural and Science master, as well as scholarships and equipment for the agricultural side at the St. Kitt's-Nevis Grammar School, the Department supplied facilities by means of which promising boys might obtain both practical and theoretical instruction in chemistry, botany, and agriculture.

The work done during the past nine years in connexion with sugar-cane experiments, the re-introduction of cotton cultivation, and the efforts made to improve the local breeds of stock by the importation of superior animals has been of very great value to the agricultural community of St. Kitt's-Nevis.

During 1906-7, the total expenditure on agricultural service in St. Kitt's-Nevis was £1,231 19*s.* 7*d.* Of this amount, the sum of £253 6*s.* 3*d.* was expended on the economic experiments with sugar-cane, cotton, etc. The receipts from the sale of plants, etc. at the Botanic Station, and of produce grown in the experiment plots amounted to £106 16*s.* 2*d.*

During the year, 1,038 economic plants were distributed. Of these 711 were *Castilloa elastica*. Interest in cacao planting also continues, and onions are still grown to considerable extent.

Under the head of Economic Experiments interesting particulars are given in regard to the results of the trials carried out with various crops, more especially cotton, tobacco (shade-grown and sun-grown), cassava, sweet potatos, and yams.

The sum of £195 5*s.* 2*d.* was expended on the branch station at Nevis during the year under review, while £90 8*s.* was received from the sale of plants and produce at this station.

The experimental work in progress at Nevis deals chiefly with yams, cow peas, Nepaul peppers, cassava, and sweet potatos. A considerable number of lime plants have also been raised at the station and distributed.

ST. LUCIA: ANNUAL REPORT ON THE BOTANIC STATION, AGRICULTURAL SCHOOL, AND EXPERIMENT PLOTS, 1906-7.

This report, which contains fourteen illustrations, is prefaced by a brief historical account of the Botanic Station of St. Lucia.

From this it appears that the station was established at the close of 1886, when Mr. John Gray of Jamaica was appointed Curator. Mr. J. C. Moore, of Kew, succeeded to Mr. Gray's post, on the death of the latter in 1895.

Following this comes a short review of the work of the Imperial Department of Agriculture as regards the island of St. Lucia. One of the most important and useful branches of work of the Department has been the raising of plants at the Botanic Station, and their distribution to planters. The total number of plants distributed, since January 1899, amounts to 199,344, of which number 20,670 were distributed free to purchasers of Crown lands.

The Imperial Department has also endeavoured to assist the planting community of St. Lucia by providing a travelling Agricultural Instructor, by the institution of an experiment station and experiment plots, by the establishment of the Agricultural School; and by the founding of an agricultural science scholarship at Harrison College, Barbados, and open to boys in St. Lucia.

Coming to the report on the work of the past year, it is stated that the total expenditure in connexion with the Botanic Station and the experiment plots, during 1906-7, amounted to £809 13*s.* 9*d.* The amount derived from the sale of plants was £64 2*s.*

The general condition of the Botanic Station appears satisfactory, and a considerable increase in the demand for nursery plants is reported. The total number of plants distributed, during the past year, was 64,850, which is the highest figure yet reached, and 39,775 more than in the previous year. Of these, 5,864 were cacao, 18,177 Castilloa rubber, and 37,116 limes, as compared with 708 cacao plants, 531 rubber plants, and 11,834 lime plants distributed in the previous year.

In regard to the St. Lucia Agricultural School, the expenditure during the year amounted to £586 14*s.* 1*d.*, exclusive of the salary of the Officer-in-charge. The health of the boys has been good, and fairly satisfactory reports on the work of the school were given on the basis of the half-yearly examinations.

The experiment plots at the school, on which are grown cacao, bananas, rubber trees, limes, and oranges, are also of value for demonstration purposes in the practical instruction of the boys.

The report of the Agricultural Instructor states that a new series of cacao experiments was started in St. Lucia during the year under review. This report also gives a brief account of several diseases of cacao, and recommendations for dealing with them. Seedling canes are stated to be gaining in favour with the planters. Some interesting results of tapping Castilloa rubber trees are given. The net profit per tree per annum (two tappings) was 10½*d.* With older trees it is thought this profit would be largely increased.

AGRICULTURAL EDUCATION IN ELEMENTARY SCHOOLS.

At the recent West Indian Agricultural Conference the subject of agricultural education received special attention, and the evidence brought forward indicated that good work has been done of late years in most of the West Indian Colonies and in British Guiana to extend this branch of teaching, chiefly through the medium of Nature Study and School Garden plots.

In view of this, therefore, the accompanying particulars, from the *Report* for 1906-7, of the Board of Education of Great Britain, in reference to the progress of agricultural education in that country should be of considerable interest:—

In the teaching of gardening there has been a great increase; the total number of boys on account of whom grants were paid for instruction in this subject having been 11,216 in 1905-6, as compared with 8,359 in 1904-5, and 5,695 in 1903-4.

The number of schools in the country areas (excluding London and other self-administered urban areas) which applied for a grant in the subject in 1906-7, was over 900, as compared with 371 earning a grant in 1903-4. Gardening is taught in practically every English county. The increase is almost entirely confined to those counties in which a Horticultural Lecturer has been appointed, part of whose duties it is to organize and supervise school gardening, and to train school teachers to teach it. This is the case in Staffordshire and Surrey, which top the list of counties with ninety-eight and seventy-nine recognized schoool gardens respectively. Moreover, it is in the counties—now upwards of twenty—that possess a Horticultural Lecturer, that school gardening is, as a rule, best carried out. Evidence continues to be received of the usual effect of gardening on the general work of the school, especially where the teachers are able to centre round the practical work some of the arithmetic, drawing, reading, and nature study.

Last year reference was made to the defect in most of the school gardening that it was not dealt with as a branch of nature study, i.e., as a study of the plant in relation to environment, the opportunity of developing the general intelligence of the scholars in rural work thus being largely lost. An attempt has been made in certain counties to provide a remedy by issuing a syllabus of nature study for the gardening classes. But this is useless if the teachers are not themselves nature students, and it cannot be too strongly insisted upon that imposing a syllabus in such cases may lead to the worst form of text-book teaching. Twenty-one counties already make some provision for affording the teachers a training in nature study, but much remains to be done. The Board have recognized for grant a number of Saturday classes and summer courses in nature study and gardening, and have provided during the year a course of nature study as an optional subject for the preliminary examination for the Teacher's Certificate, in addition to the course of rural science (including gardening) in the Training College Regulations referred to in last year's *Report*.

One of the most encouraging features in the school nature study movement is the increase in the number of school exhibits of nature study and rural economy at agricultural shows and local flower shows. The exhibits have in many cases been of a very high order of merit. To the children such exhibitions provide a stimulus; to the teachers they provide fresh ideas for work in their own schools; to the general agricultural public they demonstrate that the children's studies have a very real bearing on their future work in life.

Of other rural subjects, increased attention is being paid to fruit culture as part of school gardening, thus carrying out the recommendation of the Departmental Committee on the fruit industry in Great Britain. The Committee also advocated the teaching of gardening in training colleges. Bee-keeping is also sometimes associated with gardening, or recognized as a subject of nature study. From time to time the Board are asked to recognize, as attendance at school, time spent in manual work affording a direct training for rural life. The Board have always given sympathetic consideration to these cases, but local circumstances have up to the present prevented the work being started. During this year, however, the Board provisionally sanctioned instruction in thatching, and the work was carried out. The Board's Inspectors reported favourably upon its educational value as taught in this case, as a form of manual instruction, but it is understood that the considerable expense of providing such instruction will prevent the experiment being repeated.

Dairying has been re-introduced into the code as a special grant-earning subject. It was felt that as a manual subject for girls it was one that taught nicety and precision; as an observational subject it was one that had developed intelligence in an important branch of domestic work; and that it had the additional advantage that it is a practical means of giving a knowledge of the principles of hygiene. It was stated that, in a western county, a course of dairying to elementary school girls had led them to seek further instruction in the subject after leaving the school, thus having the effect of arousing that desire for further education which all elementary education should produce.

It is not easy to provide for instruction in rural subjects in small village schools, and the Board have had under consideration proposals for establishing upper classes in centrally situated schools where special subjects could be taught, especially in connexion with schools possessing an endowment which it was thought might be utilized to defray the special expenditure involved.

SCHOOL GARDENS IN JAMAICA.

The section of the Jamaica *Report* for 1906-7 which relates to educational work in the colony contains the following note relating to school gardens and their educational value:—

It is pointed out by the chief Inspector of Schools that certain changes made in the code last year have stimulated the formation and maintenance of school gardens with great educational benefit, not only to the school, but to practical agriculture in their neighbourhood. It should, however, never be forgotten that the main object of such work in elementary schools is in fact essentially identical with that of manual training. It aims at the training of the hand and eye and the general development of the powers of observation under circumstances, and in a medium, which correspond to the conditions under which a great majority of the children will earn their livelihood. A new officer who has had experience of their working in the United States has been appointed Inspector of school gardens.

SISAL CULTIVATION IN THE CAICOS ISLANDS.

Although the cultivation of sisal hemp for economic and export purposes has been carried on in the Caicos Islands for no more than sixteen or seventeen years, yet its rapid extension, and the now very considerable annual exports of fibre, have made it one of the chief mainstays of the dependency, coming second in importance only to the salt-preparing industry.

The sisal industry of the Caicos forms the subject of a most readable report recently prepared by the Commissioner of the Islands, the Hon. F. H. Watkins. This report contains a good deal of interesting and valuable information in regard to sisal cultivation and the preparation and grading of the resulting fibre.

The first year in which any sisal fibre was exported from the Caicos was in 1890, when a consignment of the value of £50 was shipped. In 1894 the value of the exports rose to £420, and three years later to £2,539. The year in which the greatest shipments have been made, so far, was 1899, when the exports reached the value of £7,494. This figure has been, however, approached on two occasions since. In 1906, the quantity of fibre extracted was 219,365 ℔. and the value of the exports £5,605.

The area under cultivation with sisal in the Caicos Islands is estimated at about 3,200 acres, while the industry gives employment to about 300 people. A further area of 1,000 acres in East Caicos is to be planted in the near future, while it is mentioned that several thousand acres, suitable for sisal cultivation, exist in the different islands, but are awaiting development. Two companies were formed at an early stage of the industry to carry on planting operations. In addition there exists a considerable number of small growers, many of whom are extending their area as rapidly as their limited means will allow.

These figures indicate sufficiently the rapid expansion of the industry, and its value to the inhabitants of the Dependency will be realized when it is remembered that the soil of the Caicos Islands is very shallow, that droughts are of frequent occurrence, and that that the bulk of the population were previously entirely dependent for a precarious livelihood upon salt-raking or sponge collecting.

In regard to the cost of clearing land and planting it with sisal, it is stated that in some places £1 an acre with an additional ½*d.* for each plant set out, forms the average expense, but in other cases £1 10*s.* is generally paid for an acre fully planted 4½ by 4½ feet. The average daily wages for a man in East Caicos are 2*s.* 3*d.*, for a youth 1*s.* 6*d.*, and for a woman 1*s.*

The life of the sisal plant in the Caicos Islands may be put at about eight years, at the end of which period replanting must take place. The first crop of leaves may be gathered three or four years after planting. An acre of land should yield an annual average of from 675 to 900 ℔. of fibre. At an average cost of 6c. per ℔., or £28 per ton (present price is about £32 per ton) this would give a return of £10 per acre per annum.

At the close of his report, Mr. Watkins mentions the following three conditions, the existence of which is essential to profitable results in sisal cultivation :—

(1) Capital, on account of the somewhat expensive machinery for extracting the fibre, and the length of time which must elapse before a return is made.

(2) A large area of land, especially where the soil is poor, to maintain the cultivation in regular succession.

(3) An abundant and cheap supply of labour.

SISAL HEMP AS A POSSIBLE INDUSTRY IN JAMAICA.

The *Journal* of the Jamaica Agricultural Society, commenting on the fact that the colony of Jamaica imports every year hemp rope and other cordage to the value of £8,500, in addition to home-made substitutes, points out that sisal (*Agave sisalana*, var. *rigida*) might well be grown in parts of the island where the soil is too poor for most other crops.

The following extracts are quoted from the article in question :—

> Sisal hemp grows wild in the colony, and stands dry weather almost as well as the cactus, in fact almost desert conditions. Our neighbouring country, Yucatan, grows sisal hemp to a large extent, and in the Bahama Islands it is also an important industry. The fibre is better when it grows in dry countries. In the plains of St. Elizabeth it flourishes anywhere, and a nine-months' drought did not affect plants growing among the rocks, in situations where there was apparently no earth for the roots to fasten on. In the plains of St. Elizabeth the people are in want of suitable crops, and require just some such industry as this to help them in earning a living.
>
> There is no part of the island where the people cannot make a good living, if they are inclined to work steadily, and would listen to agricultural instruction. We would recomend the untilization of the different kinds of agaves or aloes, which grow so commonly in the dry parts of St. Elizabeth, for the making of good hemp rope, which can be sold wholesale at 6*d.* per ℔. Pen keepers will gladly use these ropes, as they are strong and lasting.
>
> But it is not only as a native industry, for local use alone, that we wish to call attention to sisal hemp. As we have pointed out, the production of this hemp is a big industry in Yucatan and the Bahamas. The Queensland Government is spending a large sum of money in fostering a sisal hemp industry in that colony. We notice also that the Natal Government is likely to do the same. At one time the people of this colony, at least those most concerned in agriculture, agitated themselves over this same industry that we now speak of, and £100 was granted for fibre cultivation at Hope Gardens, where 50 acres were once in cultivation. But nothing came of this, and we are no further advanced to day than we were then. In many parts of the country sisal hemp is common, growing in hedges and along the road, and it should be a matter for attention that its cultivation for rope-making purposes should be encouraged.
>
> The price of all fibre is high at present, and is likely to continue so. The ordinary value of sisal hemp in London is not less than £29, and is often sold for as much as £38 per ton. There is no lack of machines to deal with this fibre now. The hand methods will do for local use.
>
> Sisal hemp grows best under just such conditions as exist in the driest areas of Jamaica, that is, dry, rocky, limestone soil. The dry areas could be as flourishing as other districts if planting operations were adapted to the climate. At any rate, we should like to see sisal hemp systematically tried on some estates in the driest parts of St. Elizabeth, simply to show what may be done. Even a hundred plants set out and cared for enough to give them a fair start, would be interesting and useful for experimental purposes. The rate of growth and return of fibre could be noted, and information be got ready for any development that might happen.

MARKET REPORTS.

London,—February 4, 1908, 'The West India Committee Circular,' Messrs. Kearton, Piper & Co.; February 7, 1908, Messrs. E. A. de Pass & Co.; February 14, 1908. 'The Liverpool Cotton Association Weekly Circular.'

Arrowroot—No quotations.
Balata—Sheet, 2/4; block, 1/7 per lb.
Bees'-wax—good to fine, £7 15*s.* to £8 per cwt.
Cacao—Trinidad, 76/- to 88/- per cwt.; Grenada, 69/- to 75/- per cwt.
Coffee—Santos, 30/4½ per cwt.; Jamaica, no quotations.
Copra—West Indian, £17 10*s.* per ton.
Cotton—St. Vincent, 19*d.* to 23*d.*; Barbados, 18¼*d.* to 19*d.*; St. Kitt's, 18½*d.* to 20*d.*; Montserrat, 18*d.* to 19½*d.*
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—No quotations.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—4/6 to 6/6 per box.
  Oranges—Jamaica, 5/3 to 7/- per box.
Fustic—£4 to £4 10*s.* per ton.
Honey—20*s.* to 27*s.* 6*d.* per cwt.
Isinglass—West India lump, 2/4 per lb.; cake, no quotations.
Lime Juice—Raw, 1/2 to 1/6 per gallon; concentrated, £15 10*s.* per cask of 108 gallons; Distilled Oil, 1/9 to 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£4 to £4 10*s.* per ton; Roots, no quotations.
Mace—Fair, 1*s.* 2*d.* per lb.
Nutmegs—68's to 69's, 7*d.* to 9*d.*; 75's, 6*d.* to 6½*d.*; 105's, 4¼*d.*; 111's to 115's, 3¾*d.* to 4¼*d.*; 121's, 3½*d.*; 138's, 3¼*d.*
Pimento—2¾*d.* per lb.
Rum—Jamaica, no quotations; Demerara, 1*s.* 2½*d.* to 1*s.* 4*d.*; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, 12*s.* 3*d.*; Molasses, 14/- to 14/6.

New York,—February 7, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 17c. to 19c.; Grenada, 14½c. to 18c.; Trinidad, 14¾c. to 18c.; Jamaica, 13½c. per lb.
Cocoa-nuts—Jamaica, select, $24·00 to $26·00; culls, $15·00 to $16·00; Trinidad, $23·00 to $25·00; culls, $14·00 to $15·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 8c. to 8¼c. per lb.
Ginger—9¼c. to 11c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 38c. to 43c. dry flint; 29c. to 34c. dry salted.
Grape Fruit—Jamaicas, $4·50 to $5·50 per barrel.
Limes—Dominica, $4·75 to $5·50 per barrel.
Mace—25c. to 30c. per lb.
Nutmegs—110's, 9¾c. per lb.
Oranges—Jamaica, no quotations.
Pimento—5½c. per lb
Sugar—Centrifugals, 96°, 3·75c.; Muscovados, 89°, 3·25c.; Molasses, 89°, 3c. per lb, duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co, February 18, 1908; Messrs. T. S. Garraway & Co., March 2, 1908

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $16·00 to $17·00 per 100 lb.
Cocoa-nuts—$12·25 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·75 to $2·00 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—15c.; Fancy, 16c. per gallon.
Onions—Madeira, $3·50 per 100 lb.
Potatos, English—$1·40 to $2·25 per 160 lb.
Peas—Split, $6·20 to $6·50; Canada, $3·36 to $3·35 per bag.
Rice—Demerara, $5·35 to $5·65 (180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89° $1·75 per 100 lb. package included; Dark crystals, $2·05; Centrifugals, $2·00 to $2·30 per 100 lb.

British Guiana,—February 22, 1908.—Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 20c. to 21c. per lb.
Cassava—No stock.
Cassava Starch—$9·60 per barrel.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$5·25 to $5·40 per bag of 168 lb.
Eddos—$1·44 to $1·92 per barrel.
Molasses—Yellow, 19c.; Dark, no quotations per gallon.
Onions—Madeira, 4c. to 5c; Lisbon, 4c. to 5c. per lb.
Plantains—20c. to 64c. per bunch.
Potatos,—English, $2·25 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $4·90 to $5·00 per bag; Seefa, $6·00 per bag.
Split Peas—$6·50 to $6·25 per bag (210 lb.).
Tannias—No quotations.
Yams—White, $2·16; Buck, $3·00 per bag.
Sugar—Dark crystals, $2·15 to $2·45; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·50 per M.
——Cordwood $2·40 to $2·64 per ton (3-feet lengths).

Trinidad,—February 22, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$15·75 to $17·00 per fanega; Venezuelan, $16·50 to $17·00 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—70c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·50 to $2·75 per 100 lb.
Dhal—$5·00 to $5·25 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 lb, (retail).
Potatos, English—$1·25 to $1·40 per 100 lb.
Rice—Yellow, $5·50 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$6·00 to $6·25 per bag.
Sugar—$5·00 to $5·05 per 100 lb.

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Antigua Central Sugar Factory.

THE Antigua Central Sugar Factory started operations early in 1905. An account of its origin, the constitution of the company, and the working arrangements, was given in a paper contributed by Dr. Francis Watts, C.M.G., to the *West Indian Bulletin* (Vol. VI, p. 60), while details of the 1905 and 1906 seasons' working were given in the *Agricultural News*, Vol. V, p. 49; and Vol. VI, p. 131, respectively.

In view of the fact that the factory was erected as a pioneer one, in the hope of solving the question whether it is desirable, under the conditions prevailing in the Leeward Islands, to abandon the muscovado method of sugar manufacture in favour of modern factory methods, some account of the results that have attended its working during the past three years should be of interest to all connected with the West Indian sugar industry.

The Antigua factory started with a capital expenditure of £45,359, of which £15,000 was contributed from the grant made by the Imperial Parliament some ten years ago in aid of the sugar industry of these colonies. The remainder was supplied by the shareholders forming the Factory Company, and a co-operative arrangement was made, by which the company agreed to build and run the factory, while eight estates' proprietors agreed to grow and supply the canes, during a period of fifteen years, on a profit-sharing basis. The company also agreed to provide reasonable railway facilities for the transport of canes.

For every 100 lb. of canes delivered the estates proprietors are paid the equivalent price of 4½ lb. 96° sugar crystals. Should this price be less in the aggregate than at the rate of 10*s.* per ton of canes, any profits remaining after paying working expenses, interest on capital, and a reasonable contribution to sinking and reserve funds, are first applied to bringing the payments up to 10*s.* Any profits still left over after this has been done are divided equally between shareholders and estates' proprietors.

In the first season of working (1905) the amount of sugar produced was 1,634 tons, from 15,860 tons of cane. This is equal to 1 ton of sugar from 9·7 tons of cane, and 14*s.* 1*d.* per ton of cane was paid to the estates' proprietors.

The output in 1906 was 2,348 tons of sugar from 24,676 tons of cane, 7*s.* 5*d.* per ton of cane being paid to the estates' proprietors. It took 10·5 tons of cane to produce a ton of sugar. The best results were obtained in 1907, when 4,230 tons of sugar were made from 40,782 tons of cane, or 1 ton of sugar from 9·64 tons of cane. On division of profits at the end of the 1907 season, after paying 10*s.* per ton for the canes, a further sum of 2*s.* 3*d.* per ton of cane supplied (making 12*s.* 3*d.*) was allotted to the contracting proprietors.

Although the factory was only planned to turn out 3,000 tons of sugar, yet the 1907 output was 4,230 tons, and there is now an assured cane supply, calculated to yield about 5,000 tons of sugar in a moderately good season. Estate owners other than the original contracting proprietors in many cases were glad to sell canes to the factory instead of making muscovado sugar.

The factory started with two three-roller mills, and during the 1907 crop season a Krajewski crusher was added to the plant. This of course entailed extra outlay of capital, and further expenditure was incurred by extension of the railway, the total length of which is now 9 miles, and by minor additions to the plant. These additions and extensions brought the total capital expenditure up to £52,159. Of the extra outlay about £3,500 has already been paid by being charged in the annual expenses of working; £3,300 are this year added to capital account from the profits, and the remainder will appear as a charge in future accounts.

During the three seasons 1905-7, the original contracting proprietors delivered 62,274 tons of cane to the factory, for which the sum of £28,501 1*s.* 5*d.*, or practically 9*s.* per ton, was paid on the 4½ lb. of sugar per 100 lb. of cane basis. In addition to this, however, as the result of the distribution of profits during the three seasons, these proprietors have received the sum of £7,367 4*s.* as cash bonuses, over and above the original prices paid for the canes. This brought the average price per ton during three years up to 11*s.* 4*d.*

From the review of the accounts of the factory presented by Dr. Watts, C.M.G., in a paper at the recent Agricultural Conference, it appears that the total gross profits earned during the three years of working amount to £26,665, exclusive of interest on share capital. Of this sum, £12,482 have been paid out as cash bonuses—£7,367 to the estates' proprietors, as mentioned above, and £5,115 to the shareholders. This leaves a sum of £14,183 still to be accounted for.

Depreciation charges (5 per cent. on £50,000 for three years) amount to £7,500, leaving a remainder of £6,683 invested in the factory. Under the terms of the agreement, the 'A' (or original) shareholders and the original contracting estates' proprietors share equally in that portion of the profits which have not been paid out as cash bonuses. Hence one-half of the above sum, £3,341, belongs to each contracting party, which, in the case of the estates' peoprietors, is equal to an additional 1*s.* 0¾*d.* per ton of cane supplied.

The position of the original contracting estates' proprietors may be summed up in saying that they have sold 62,274 tons of canes, and have received £28,501, or 9*s.* per ton., by way of first payment; a further £7,367, or 2*s.* 4*d.* per ton, by way of cash bonus, and have invested £3,341, or 1*s.* 0¾*d.* per ton of cane supplied, in the factory itself.

The 'A' shareholders have received 5 per cent. interest on their money, and in addition cash bonuses of £5,115, equal to an additional 6·8 per cent. per annum, or together, 11·8 per cent. In addition, there is the investment in the factory of £3,341 out of the profits, making a further 4·4 per cent. per annum, or 16 per cent. in all.

It may be added that the factory has made, during the three years, 8,214 tons of sugar, which realized £81,682, or on the average, £9 18*s.* 10½*d.* per ton. Taking this price of sugar as a basis, and assuming that 100 lb. of canes are equal in value to 4½ lb. of 96 sugar, it is interesting to note that the value of a ton of canes works out at 8*s* 11½*d.*, a figure practically identical with the average first payment made.

A sum of £2,000 has, each year since 1905, been written off towards a sinking fund. The capital charges of the factory have in this way been reduced by £6,000. In 1907, too, £2,000 was carried to the reserve fund.

Canes are also purchased by the factory from outside estates and from peasant proprietors. While the original estates' proprietors receive payment on the basis of 4½ lb. of sugar per 100 lb. of canes, with a share in the profits. the payment for canes from outside estates is a matter for bargaining. They are, however, usually bought on the basis of 5½ lb. of sugar per 100 lb. of cane, which works out at about 11*s.* 4*d* per ton of canes. It was stated that the owners of the outside estates were perfectly satisfied to sell their canes at this rate. The factory, too, is under an obligation to the Government to purchase a certain amount of peasant-grown cane each year, for which a price of not less than 7*s.* 6*d.* per ton. must be paid.

SUGAR INDUSTRY.

Seedling Canes in the Leeward Islands.

No. 50 in the Pamphlet Series issued by the Imperial Department of Agriculture has just been published, and contains particulars of the experiments with seedling and other canes, carried on in Antigua and St. Kitt's during 1906-7, under the direction of the Department. The critical notes on the characters of the chief varieties of canes on trial should be of interest to planters anxious to make the best selection for their estates. These notes are therefore reproduced below :—

Sealy Seedling. This cane has given good results in the experiments both at Antigua and St. Kitt's. At the former, it has given satisfactory results as plants and also as ratoons, but at St. Kitt's it has not ratooned well. It is a cane of great vegetative vigour, capable of growing on rather poor and heavy soils where other canes will not thrive, and it appears to stand drought fairly well. It is to be recommended for cultivation on heavy, clayey soils. This cane mills well, but its juice is not exceptionally rich in sugar.

B. 208. This cane requires good, well-tilled soil with a fair rainfall. It grows freely and is easily established ; it ripens quickly and thus offers advantages in cases where the land is required for other crops in a rotation. It yields juice of exceptional richness.

In ordinary mills it mills well, but is inclined to be somewhat brittle, and therefore is rather difficult to handle where a Krajewski crusher is used.

D. 625. This is a yellow cane, usually of large size, a vigorous grower, but yielding juice which is not exceptionally rich in sugar. The average sucrose content of the juice from plant canes for this season at Antigua was low. It is a cane that is likely to attract the attention of planters and will shortly be introduced into the experiments at St. Kitt's.

B. 156. This is a yellow, erect cane having light-green leaves. It arrows rather freely. It would appear to be more suitable for the heavy, clayey soils of Antigua than for the light ones of St. Kitt's, thus somewhat resembling the Sealy Seedling. The juice which it yields is not very rich in sucrose.

D. 109. This is a purple cane introduced somewhat recently into these experiments. It has given good results at Antigua both as plants and ratoons. At St. Kitt's the plant canes were satisfactory, but the ratoons were poor. The juice is of moderate richness in sucrose. Like some of the other canes (notably Sealy Seedling), it would appear that this cane is more suitable for the heavy soils of Antigua than for the light ones of St. Kitt's.

B. 367. This is a short, erect, grey or pink-tinged cane with broad, light-green leaves. It arrows freely. At one time it was thought promising in St. Kitt's, but it has not occupied a prominent position there recently. It ratooned well during the last season at Antigua. The juice is only moderately rich in sucrose. This cane must be classed as one of moderate merit.

B. 306. This is a yellow cane not unlike the Bourbon. It does not arrow excessively. It has given good returns both at Antigua and St. Kitt's as plants and as ratoons, though the ratoon canes at both places have, this season, been somewhat below the average. It is a cane worth attention in a moderate degree. Sucrose content of juice moderate. Instances are reported where this cane has become dry and hollow in parts, and there is a suspicion of liability to disease. These points should be noticed.

D. 116. This is a yellow, erect cane with very broad, dark-green leaves. It arrows freely. The cane appears well suited to the conditions obtaining at St. Kitt's where it has given good results and where it can be recommended for planting. It appears less suitable for planting in Antigua. The juice is somewhat poor in sucrose.

D. 130 is a dark-green, erect cane with dark-green leaves. It is easily grown and arrows freely. It appears to be of moderate merit only, but might be cautiously tried on a small scale. The juice has a fair sucrose.

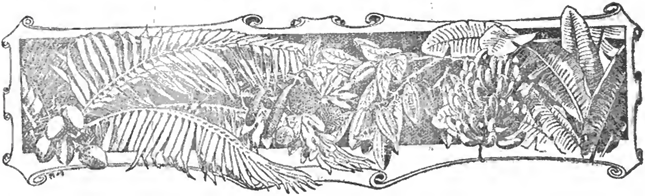
D. 95. This is a dark-purple, erect cane which, when growing, often presents a shabby, unsatisfactory appearance. It therefore frequently happens that when the cane is reaped the yield is in excess of what was anticipated. The sucrose content of the juice of this cane is usually very high, though it is to be observed that this feature has not been conspicuous this season in the juice from plant canes. This cane thrives best on somewhat heavy moist land, and it does not stand drought well. It is not well suited for the conditions of St. Kitt's, but in some districts in Antigua it gives very good returns and is being planted in fair quantity.

D. 74 is a pale-green, erect cane with light-green leaves, and is of interest because of the attention which it has attracted in Louisiana. It has given fairly good results under experiment at St. Kitt's, but has not been so successful at Antigua. The juice is of moderate richness.

B. 147. A yellow, long-jointed cane, inclined to trail, having broad, dark-green leaves. It rarely arrows and is now very extensively planted in St. Kitt's. Its cultivation is also being rapidly extended on the lighter soils in Antigua. It is conspicuous as a disease-resisting cane ; its timely introduction into St. Kitt's saved the situation when the ravages of disease bade fair to ruin the sugar industry. Its juice is of full average richness in sucrose when the canes are fully mature. It is an excellent milling cane, containing a large quantity of juice, which it yields very freely. When this cane is being crushed the capacity of the pumps attached to the mills is frequently taxed to the utmost, owing to the great flow of juice.

White Transparent. This cane, which is known locally under many names (Naga B., Caledonian Queen, Rappoe, Mount Blanc, and Jamaica cane are believed to be synonyms), is the variety that is most extensively planted at Antigua where it was introduced to replace the disease-stricken Bourbon with happy results. As it fell a prey to disease at St. Kitt's, its place has there been largely taken by B. 147. It is a grey or pink-tinged cane, somewhat inclined to trail, having broad, dark-green leaves. It arrows freely. The juice is of average richness in sucrose, but at times is inclined to be gummy. It is a somewhat fibrous cane. It is believed that several canes of greater merit are now at the disposal of planters, and it is anticipated that it will be steadily superseded by other canes at Antigua in a manner similar to that already adopted by the planters in St. Kitt's.

B. 303. This cane, which has only recently been introduced into Antigua, showed a disposition to die out in ratoon canes during this season. This was probably due to the dry weather experienced during the early part of the season, but if this character is confirmed, it will render this cane an undesirable one for planting in this island.



WEST INDIAN FRUIT.

SPINELESS LIMES IN DOMINICA.

The spineless variety of lime is believed to have originated on the Shawford Estate, Dominica. In the *Agricultural News* (Vol. I, p. 38) it was mentioned that on this estate, in 1891, a lime tree was noticed without the usual spines. On sowing seeds from the fruits of this interesting tree, some 75 per cent. of the resulting plants came 'true,' proving themselves to be spineless. A plot was formed at the Botanic Station, and since that time plants have been regularly raised for distribution in Dominica. At present it is stated that about 20,000 lime trees of the spineless variety are growing in the island, this being equivalent to an area of 100 acres.

Some particulars in reference to the distribution and growth of spineless lime trees were given in the 1905-6 report on the Dominica Botanic Station, and reproduced in the *Agricultural News* (Vol. V, p. 276). The report on the Botanic Station for 1906-7 includes a paper, prepared by Dr. Watts, C.M.G., containing a good deal of further information on the subject.

With a view to comparing the yields of juice and the percentage of citric acid in the juice, of the spineless and the ordinary varieties of limes, tests of the two kinds, grown as nearly as possible under similar conditions, have been made from time to time at the Government Laboratory, Antigua. The results of these tests go to show that while the fruit of the spineless lime is smaller than that of the ordinary variety, a relatively larger yield of juice is obtained from the spineless variety, and this juice would appear to be purer, as well as richer in acid. Five examinations were made, at different times, of fruits grown at the Botanic Station. The average amount of citric acid in the juice of the ordinary variety was 8·35 per cent., or 13·4 oz. of acid per gallon of juice, while the citric acid content of the juice from the ordinary variety reached an average of 9·29 per cent., or 14·86 oz. of acid per gallon of juice. Further, while the ordinary variety of lime gave a yield of juice equal, on the average, to 49·8 per cent. of their total weight, the spineless lime yielded juice equal to 53·25 per cent. of their whole weight.

The report also gives figures relating to tests carried out by Mr. A. E. Agar of Dominica, with the object of determining the relative merits of the two varieties. In these experiments the spineless lime gave a return of juice 12 per cent. greater than that yielded by the ordinary variety. The fruit of the spineless lime contain comparatively few seeds, while the skin is smooth and thin. There appears to be no difference in the quantity or quality of the essential oils produced by the two kinds of limes.

It remains to be seen whether the spineless lime will find favour in connexion with the fruit trade. The thinness of the skin, the small number of the seeds, and the juciness of the fruit may more than compensate for its small size. This however, is a matter which can only be determined by carefully conducted trial shipments.

FRUIT CULTURE IN PORTO RICO.

The fruit industry of Porto Rico, which in its present stage, is an important and promising one, and which will undoubtedly undergo considerable development with the provision of better facilities of transport, etc., formed the subject of a paper read at the first annual meeting of the Cuban Horticultural Society, held in May of last year.

Fruit lands in Porto Rico, it is stated, are yearly increasing in value. Land which, a few years ago, could be bought at $10 and $20 per acre now costs $50 and $100. Pine-apples do so well that soils suitable for this crop command very high prices. Much of the land best suited for citrus fruit growth, however, has not yet been planted, as the districts in which it exists have not yet been opened up by roads.

The citrus fruit districts of Porto Rico are almost entirely confined to the north side of the island, and comprise an area of 7,000 or 8,000 acres. About 70 per cent. of this is planted with oranges, 25 per cent. with grapefruit, and 5 per cent. with lemons.

The oranges grown include a considerable number of Floridian varieties. The early and the late kinds are expected to give more profitable results than varieties ripening in mid-season. The Washington Navel orange is cultivated, and appears to do much better in Porto Rico than in Florida. Some of the native varieties of oranges, however, are reported to do better than any imported kinds.

Great numbers of orange trees grow wild in the mountainous districts. The fruit is stated to be of excellent quality, and would ship well if properly handled. It grows, however, too far from the railway or from passable roads to be a source of profit to any of the inhabitants. It is estimated that 100,000 boxes of oranges are annually lost in Porto Rico on this account.

Artificial manures are used on a fairly considerable scale in the cultivation of both oranges and pine-apples.

CACAO EXPERIMENTS IN THE WEST INDIES.

At the recent West Indian Agricultural Conference, held at Barbados, Mr. Joseph Jones, Curator of the Dominica Botanic Station, read the following paper, dealing with the propagation of cacao by budding and grafting:—

The variety of cacao first grown in the West Indies was the Criollo, the best kind, but very susceptible to any adverse conditions. More hardy varieties, introduced later, are the Forastero and Calabacillo, which to-day are cultivated so largely in the British West Indies.

At the present time Criollo cacao appears to be grown on any scale only in favourable localities on the mainland of Central America. Its produce is of the highest quality, but the tree is delicate, and the yield per tree is low. This is compensated for by the high prices which this variety fetches.

From time to time attempts have been made to grow Criollo cacao in Dominica, but success has never followed any of them. Planters who have tried to grow it express regret for what experience teaches them was wasted effort.

The growing of the Forastero and Calabacillo varieties of cacao in the West Indies has been a great commercial success. Although the beans are inferior and, in the Calabacillo, extremely bitter, there is still a great demand for it, and it pays to grow.

Commencing with the cultivation of the best kind, the cacao planter has been forced to give this up in favour of the Forastero variety, a hardier type yielding a lower-grade produce Very large plantations of this exist to-day, but the variety appears to be weakening. Investigations made by scientists, at the instance of planters, have shown how numerous are the enemies of the cacao tree. Several of these diseases have been described and their seriousness has been pointed out. One or more of them may become virulent at any time and inflict great loss on planters. The ravages caused by the 'Witch Broom' disease in Surinam must be fresh in the memory of all interested in these matters.

Some planters now grow the Calabacillo variety alone, on account of its hardiness and freedom from disease. Those who know by experience how harassing is the presence of the 'canker' and kindred diseases in a plantation will understand why planters prefer hardy trees and a low-grade produce, to delicate trees, bearing high-grade produce.

The method of propagating cacao is the same to-day as always practised. Good pods from trees showing some desirable quality are usually selected and sown. Such seedlings, if planted under good conditions, commence to bear in five or six years and reach their prime when twelve to fifteen years old. Owing to cross-fertilization, very few are exactly like the parent, and seed from one Forastero tree will produce plants of the Forastero type and also of all its sub-varieties. It is due to this fact that it is not possible to take full advantage for propagation purposes of trees that sometimes appear on plantations and are noticeable on account of their hardiness, freedom from disease, and good bearing qualities.

It is important that when trees showing desirable qualities have been noticed and have been tested for a number of years, these types should be fixed and perpetuated. This can be done by budding and grafting.

The Botanical Department of Jamaica has shown that budding of cacao can be done under certain conditions. The Botanical Department of Trinidad recommended the grafting of cacao some years ago.

Experiments conducted at the Dominica Botanic Station show that grafting cacao by approach can be fairly easily carried out. A tree of good type is selected, and rough stages are erected round it at varying heights in such positions as to be able to obtain a maximum of young shoots to graft on the stocks which have already been grown in nurseries in bamboo pots. The pots are placed on the staging, young shoots of the cacao tree of the same age and thickness as the stocks are carefully denuded of their leaves at the point where they are to be fitted to the stocks, a portion of the bark is removed with a sharp knife both from the scion and the stalk, and the two are gently but firmly bound together with garden tying. A small piece of bark is cut from the stem of the scion below the graft so as to make it more dependent on the stock and to hasten the union. In short, it is simply the well-known system of grafting mangos by approach, applied to cacao.

At certain seasons, with good, healthy stocks, cacao can be grafted in six weeks; but the average time may be placed at about ten weeks. The plants must be watered daily. When ready to be taken off, they may be planted in the field at once or may be removed to a shady nursery and watered daily until the time of planting.

At present the only stocks available are the Calabacillo and strong Forastero kinds. *Theobroma Bicolor* has been tried as a stock and has failed. It is possible, if the known species of *Theobroma* could be brought together, that one or more might prove more hardy than *Theobroma Cacao*, and at the same time suitable as a stock on which to graft the commercial kinds.

It will, of course, be more costly to plant a field of cacao with grafted than with seedling plants, but the advantage should rest later with the grafted plants. Nothing should be used for propagation but prolific, well-tried kinds, that have shown themselves resistant to the diseases now prevalent in cacao plantations. Some of the advantages that should be gained by this method may be stated below:—

(1) A planter would be able to grow fields of plants of one selected strain, the beans of which would all require just the same degree of fermentation.

(2) It would be possible to propagate disease-resisting varieties.

(3) Grafted plants, well cared for, should fruit earlier than seedlings, thus giving a quicker return on capital invested.

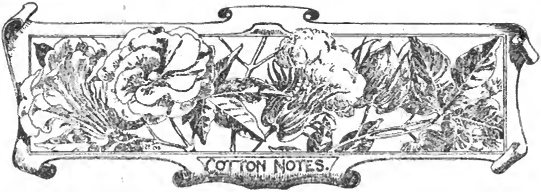
(4) The return per acre should be increased by the selection of prolific types.

(5) The effect of grafting may tend to dwarf the plants. This would be an advantage in islands which suffer from much windy weather.

(6) The growing of grafted selected cacao, combined with intensive cultivation, would be the high-water mark of successful cacao cultivation.

Over 200 grafted plants have been taken from two selected trees in the Botanic Station. Sixty have been planted in the gardens. These will be carefully watched and the results recorded later. A number of these are the Alligator cacao (*Theobroma pentagona*) worked on Forastero stocks.

On estates where the area of cultivation is being increased each year, the system mentioned above should be tried. It should be a recognized part of estate work to propagate, by grafting, the best strains of cacao. Botanic Stations cannot in this instance supply large quantities of plants, because cacao plants in bamboo pots cannot be conveyed long distances by road in islands like Dominica, without considerable expense and probable injury to the plants.


COTTON NOTES.

SEA ISLAND COTTON MARKET.

In their Sea Island cotton report of February 22 last, Messrs. Henry W. Frost & Co., of Charleston, write as follows with reference to the condition of the market:—

With the continued absence of demand the market remains at a stand, and normally unchanged. In order to effect sales, however, we think that factors would be willing to make considerabe concessions from their asking prices. We give the following quotations: Fully fine to extra fine, 38c. to 40c.; fine, 35c.; fine to fully fine, but tinged and stained, 22c. to25c.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date March 2, with reference to the sales of West Indian Sea Island cotton:—

Since our last report about 280 bales West Indian Sea Island cotton have been sold, comprised of about 150 Barbados, chiefly at 17½*d.*, with a few at 18*d.* and 18½*d.*, 80 Montserrat, at 17*d.* to 18½*d.*, 40 Superior Nevis at 18*d.*, 25 St. Kitt's 17½*d.* to 18*d.*, with a few odd bags at 19*d.*

The tendency of the market is downwards, quotations being reduced 1*d.* per lb., and buyers are very particular in selecting the lots which they care to purchase, as they are only buying for immediate requirements, and in the present state of trade will not add to their stock.

COTTON CROP OF ST. VINCENT.

Mr. W. N. Sands, Agricultural Superintendent of St. Vincent, has forwarded to the Imperial Commissioner of Agriculture the following report on the 1906-7 cotton crop of the island:—

The estimated St. Vincent Sea Island cotton crop is 1,200 bales of 363 lb. each. About 1,000 bales have been ginned to date. The prices realized for the first shipment have been from 20*d.* to 25*d.* per lb., but with a falling market, lower prices are expected for the later shipments. The yield generally has not been so good as last year. This was due to an exceptionally wet December; in fact December was the wettest month of the last year. Owing also to this fact, growers were not able to prepare their cotton for the ginneries as well as in previous seasons.

In the Grenadines, however, good returns have been obtained. In some cases they reached nearly a bale an acre. Picking being finished on most estates, planters are now pulling up and burning the cotton stalks. Unless this operation is effectively carried out generally, the leaf-blister mite and black scale will do a great deal of damage to the coming season's crop.

WEST INDIAN SEA ISLAND COTTON.

In a pamphlet lately issued by the U. S. Department of Agriculture, 'Sea Island Cotton: Its Culture, Improvement and Diseases', the following note occurs on the development of the West Indian Sea Island cotton industry:—

Sea Island cotton produced in the West Indies is equal to the average American product, and indeed competes with the Carolina Sea Island cotton rather than with the interior product. The West Indian industry is new, having been developed mainly since 1902, and is yet of small proportions. Only about 4,000 bales per annum are at present produced; but the industry there may grow rapidly It has already led the South Carolina planters to organize in refusing to sell seed.

The Sea Island grower will therefore recognize that the prices of his crop depend on several factors, and that quality is more important than quantity. Organized efforts should be made to raise the standard of length and preparation in order to avoid competition with cheaper cotton. Of the better grades a larger quantity can be sold than is now produced.

SEA ISLAND COTTON IN SOUTH CAROLINA.

The accompanying note, from *Farmer's Bulletin 302* of the United States' Department of Agriculture, instances the value of seed selection as a chief factor towards the production of the best quality Sea Island cotton:—

In the Charleston district of South Carolina the finest cotton is that grown by a limited number of planters who have for many years paid the most careful attention to seed selection. Their cotton is not only long and fine, but it is picked with so much regard to cleanliness and uniformity that the grower's private brand on the package is often a sufficient guarantee of its quality.

These fine 'crop lots' comprise about 35 per cent. of the cotton marketed in Charleston, and sell for from 30c. to 60c. a pound. They are all exported. The demand for this extra-fine and high-priced cotton is very limited. The remainder of the South Carolina crop is sold in the usual manner at lower prices. The higher price secured for South Carolina cotton is largely because of its superior preparation, all stained and weak cotton and bits of leaf being removed before baling. The exercise of every possible care in preparation may mean a difference of from 5c. to 10c. per lb. to the grower. Loss of grade is due to exposure of weather before picking, to storing or ginning when too wet, and especially to the presence of stained or yellow cotton and bits of leaf or other trash.

HYDROCYANIC ACID CONTENT OF CASSAVA.

The question of the danger of poisoning arising from the consumption of imperfectly cooked cassava has formed the subject of several notes and articles in the *Agricultural News* (Vols. I, p. 5; II, p. 102; and III, p. 423), and a leaflet (*Hints and Information in regard to Cassava poisoning*) dealing with the subject was issued some two or three years ago.

Some investigations in connexion with the amount of hydrocyanic acid and starch present in cassava have recently been carried out by the Bureau of Chemistry of the U.S. Department of Agriculture, and the results are published in *Bulletin No. 106* of the Bureau. The previous work that has been done in relation to this question has chiefly been undertaken in Trinidad by Professor Carmody and his predecessor in the office of Government Analyst, and by the Hon. H. H. Cousins in Jamaica.

Cassava has been divided into sweet and bitter varieties, and although sweet cassavas are considered to be less poisonous than the bitter varieties, yet it appears that the sweet or bitter character of a cassava is not directly connected with its content of hydrocyanic acid, but is dependent upon the absence or presence of some bitter principle. As the result of his investigations, made some five years ago, Professor Carmody reported the mean percentage of hydrocyanic acid in the sweet varieties examined as 0·010, and in the bitter varieties as 0·022. It is usually held that sweet varieties contain only half as much prussic acid as those known to have been fatal.

Varieties of cassava grown in Colombia, and analysed by the Government Analyst of Jamaica showed a mean percentage of only 0·001 of hydrocyanic acid, the maximum being only 0·003. From this it appears that all the Colombian cassavas may practically be classed as sweet.

On the other hand, analyses of native bitter cassavas made by the same officer show percentages of hydrocyanic acid of from 0·036 to 0·077.

Professor Carmody suggests that the difference between the two kinds consists in the hydrocyanic acid being distributed throughout in the bitter kind, whereas in the sweet varieties, it exists chiefly in the cortex.

In regard to the proportion of hydrocyanic acid present, this is certainly influenced by environment, and the experiments with cassava that have been in progress in Jamaica for some years past (*Agricultural News*, Vol. VI, p. 261) would appear to indicate that when a variety—usually cultivated in elevated districts—is transferred to lower levels of country, the proportion of hydrocyanic acid tends to increase. Mr. Cousins reports that fourteen varieties of cassava, stated to be quite non-poisonous in Colombia, were tested after a year's growth in the Liguanea plains of Jamaica, and were found to contain, on the average, 0·0034 per cent. of hydrocyanic acid. After a further period of four years' growth in the same changed locality the hydrocyanic acid content rose to 0·0124 per cent., or practically fourfold. On the other hand, a report from Trinidad, dealing with this question, notes that residents of Colombia, who have imported bitter varieties from Jamaica, find they have become sweet.

The work referred to as having been carried out in the United States was conducted at Biloni, Mississippi, and at Miami, Florida, in 1904 and 1905. Cassava is a crop that may be grown in any of the Gulf States, and it was felt that the great feeding value of the roots, could the danger of poisoning be eliminated, justified investigation of the hydrocyanic and starch contents of different varieties, and the conditions which influenced variation in these constituents.

Thirty-nine varieties were under trial at Biloni and twenty-eight at Miami. The whole of those raised at Miami were originally obtained from Jamaica, while at Biloni twelve varieties from Porto Rico were grown in addition to the Jamaica kinds. At Biloni, a common native variety, Florida Sweet, was also grown.

It is curious to note that none of the imported varieties gave so low a percentage of hydrocyanic acid as 'Florida Sweet,' which contained only 0·002 per cent. Pie de Perdiz and Cenaguera approached it nearly, however, with an average content of 0·003. Of the cassavas grown at Biloni, Porto Rico White Top contained the highest proportion of hydrocyanic acid, 0·030 per cent. This was closely followed by Porto Rico Auntie Grace, with 0·028 per cent., and by the Mantera and a Helada variety from Jamaica, which contained 0·026 and 0·022 per cent. respectively. At Miami, Florida, the percentage of hydrocyanic acid was, in the great number of cases, somewhat lower than at Biloxi. In the twenty-eight so-called sweet varieties grown at Miami, the hydrocyanic acid content ranges from 0·0005 to 0·016 per cent., and more than half the varieties contained 0·002 per cent. or less. On reference to the Biloni results with the same varieties, it is seen that two-thirds of the samples contained 0·010 per cent. or more of hydrocyanic acid. The Mantera cassava, for example, which at Biloni showed a proportion of 0·026 of hydrocyanic acid, contained only an average of 0·006 at Miami. Statements have in the past been made to the effect that varieties of cassava grown in Florida, cease in time to be poisonous, and these results certainly give some ground for this theory.

The chief portion of the hydrocyanic acid was, in the case of both bitter and sweet cassava, found to exist in the cortex.

From the observations made, there does not appear to be any relationship between the starch and the hydrocyanic acid content of the cassavas.

CYCLONE IN ST. KITT'S-NEVIS.

Mr. F. R. Shepherd, Agricultural Superintendent of St. Kitt's-Nevis, has forwarded a report to the Imperial Commissioner of Agriculture on the damage done by the cyclone which passed over St. Kitt's-Nevis during the night of Saturday, March 7, and the early hours of the following morning.

The weather had been unsettled in St. Kitt's since Friday, and throughout Saturday the wind blew in strong puffs from the west.

On Saturday night the wind blew violently from the north-west with a falling barometer. By midnight the wind was at its height, and in Basseterre the barometer reading fell to 29·3. Rain fell heavily, over 4 inches being registered in Basseterre, and over 8 inches at Molineux in the northern part of the island. About 3 inches of rain fell in Nevis.

The disturbance passed quickly, however, and by 10 a.m. on Sunday, the weather had cleared, the wind changing to east.

As the result of the storm, a large number of trees were blown down in St. Kitt's. The cane crop, being very advanced, sustained considerable damage, being levelled with the ground in some cases. Apart from the loss due to broken canes, the quality of the juice will be lowered as the result of the heavy rains. The cotton crop of Nevis has been all reaped and ginned, so consequently no damage was experienced.

At the Botanic Station a few cedar trees were blown down and some others damaged

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

An account of the origin and results of working, during the past three years, of the Antigua Central Sugar Factory is given in the editorial.

Some interesting notes on the characteristics of the chief varieties of seedling canes under trial at Antigua and St. Kitt's will be found on page 83.

The spineless variety of lime, which is being tried on a fairly extensive scale in Dominica, gives good results as compared with the ordinary variety. (page 84.)

Mr. Jones' paper, dealing with cacao grafting experiments at the Dominica Botanic Station, is reprinted on page 85.

Some brief notes of interest relating to the cotton industry, including market reports, appear on page 86.

Experimental work in relation to the hydrocyanic acid content of cassava, carried on in Trinidad, Jamaica, and the United States, is reviewed on page 87.

Some practical remedies for insect pests are discussed under 'Insect Notes' (page 90).

It is hoped that the West Indies will contribute to the International Rubber Exhibition to be held in London in September next (page 94).

Agricultural Apprentices in British Guiana.

Just over three years ago the scheme for training a limited number of lads in the principles of agriculture at the Botanic Gardens was put upon its trial, and the work was started with six lads fresh from school. In this initial experiment, however, only two boys, both from the Friendship Wesleyan School, East Coast, had sufficient perseverance to take full advantage of the opportunity, and to continue the course to the end.

A second lot of six students entered for a three-years' course at the beginning of the present year. These are housed at the Orphan Asylum, and a part of their pay is deducted each week, to go towards the expense of their board and lodging.

It is hoped that later it will be found possible to take on a dozen boys at a time.

Seedling Canes in Antigua and St. Kitt's.

The figures given in Pamphlet No. 50, just published by the Imperial Department of Agriculture, indicate the increasing extent to which seedling canes are displacing the Bourbon and White Transparent varieties in Antigua and St. Kitt's.

Sixty estates in Antigua reaped 8,879 acres of canes in the crop season of 1907 of which 1,902 acres, or 21·4 per cent. of the whole, were planted with seedling canes. For the crop season of 1908 on the same estates, the area devoted to seedling varieties in Antigua had increased to 2,121 acres, or 24·1 per cent.

In St. Kitt's, no less than 5,314 acres out of a total area of 7,506 acres, or 71 per cent. are planted with the newer seedling varieties. This relatively large proportion, as compared with Antigua, is due to the fact that the White Transparent cane, grown in St. Kitt's, does not exhibit the immunity to disease it has shown elsewhere, and hence it has been necessary to look for more resistant varieties.

Labour in Trinidad.

The proper adjustment of the wages to be paid for indentured and free labour respectively, in Trinidad, has been causing some trouble of late.

Under a previous enactment the rate of wages paid for indentured labour must not be less than would be paid to a free labourer for the same work. Under these conditions it was impossible to raise the wages of the creole workman, without at the same time increasing those of the indentured East Indian as well. But inasmuch as the latter also obtained perquisites of the value of from 11c. to 18c. per day, besides being entitled to constant employment, it is hardly to be wondered at that this arrangement should require modification.

As the result of inquiry into the question by a Select Committee, the Secretary of State has sanctioned an alteration in the Immigration Ordinance, the effect of which will be to enable employers to raise the wages of their free labourers by an amount equivalent to the free quarters and medical attendance provided for the indentured East Indians.

American Maize Crop.

The final official estimate of the American maize crop of 1907 is 2,592,320,000 bushels. Although this is fully 335,000,000 bushels less than the yield of 1906, which formed a record crop, it has been exceeded only in that year and in 1905. There is consequently an ample quantity for export, and the amount shipped will probably be quite as great as would be the case if the crop were considerably larger. This is due to the fact that, with a record crop, prices tend to drop, and growers prefer to feed the corn to stock instead of selling. At present prices, however, it would be more profitable to place on the market. As a rule, about one-thirtieth part of the maize crop of the United States is exported.

Mule Raising in Cuba.

The increased attention that is being devoted to agriculture in Cuba, and the adoption of more up-to-date methods, have brought about the necessity for more efficient motive power on the estates than the native oxen. This has led to an increased demand for mules, and good animals are reported to fetch from $220 to $250 on the Havana market.

The growing value set upon mules in Cuba of late years is indicated by the greater number of these animals annually imported into the island. In 1902-3 the imports numbered 2,128 head; this increased to 3,454 in 1903-4, while the mule imports of 1904-5 reached 6,801. Most of these animals were obtained from the United States, Mexico, and the British West Indies. As mules can be bred cheaply in Cuba, increasing attention is being given to this branch of stock farming.

Trinidad Oil-fields.

In his report on the oil-fields of the Central Anticline (Central District of Trinidad), Mr. E. H. Cunningham-Craig states that the surface indications of oil are not numerous but are very striking in character.

Favourable conditions for drilling along the Central Anticline extend eastward through the Oropuche Lagoon, and the horizon of the Rio Blanco Oilsand continues to be petroliferous when traced in this direction.

Drilling can be confidently recommended along the greater part of the line on both sides of the crest, but Mr. Craig thinks it probable that wells drilled south of the crest would prove more productive than if sunk on the northern flank. The line between the Moruga Road, and the point where the anticlinal crest reaches the lagoon seem to offer the most favourable conditions.

One of the chief difficulties that would be encountered by oil companies are the steep dips prevalent over a large part of the Trinidad oil-fields. It is only in fairly deep wells, however, that difficulties caused by steep dips become very serious, and Mr. Craig states that any part of the area referred to in the report can be tested for oil without the necessity of drilling wells deeper than 1,000 feet.

Agricultural Conditions in British Honduras.

British Honduras is a colony of great agricultural resources, but up to the present, the development of these resources has progressed very slowly. To a large extent this can be accounted for by the want of good roads and the poor facilities of transport that exist within the colony. These considerations have been mainly responsible for the fact that capitalists preferred to make investments elsewhere, while the peasantry have chiefly made a living out of the wood-cutting industry.

The soil and climate of British Honduras are undoubtedly suited for the growth of many valuable crops, such as limes, bananas, rice, maize, and cacao, and in the future these will probably form staple products of the colony. The past year was a good one, and the agricultural exports showed a considerable increase; but the rate of development is still slow, and the peasantry are stated to be emigrating in search of work elsewhere.

This is very unsatisfactory in a colony where there exists such a large area of Crown lands, and it is possible, as the *Belize Clarion* suggests, that a modification of the conditions under which lands are taken up in British Honduras might go far to increase the number of small holdings, and encourage the peasantry to settle at home, instead of emigrating as they are doing at present.

Packing Cacao Seeds.

A method of packing cacao seeds for export, which had given good results in Samoa, was described in the *Agricultural News* of October 20, 1906 (Vol. V, p. 331).

By this method, ripe seeds, after being well washed, were gently rubbed with a rough towel in order to remove the pulp, care being taken not to damage the skin. The beans are next placed in a current of cool air for twenty-four hours. The material with which the seeds are packed consists of a mixture of equal parts of vegetable mould and finely ground charcoal, moistened to resemble earth taken from a shady place. A layer of this mixture, ¾ inch deep, is spread in the bottom of a tin box (8 × 4 × 4 inches) and on this rows of seeds are placed, another layer of charcoal and mould coming above. The box is filled in this way with alternate layers of seeds and packing mixture, and a box of the above dimensions will hold about 200 seeds.

In order to put the above method to the test at Kew Gardens, a request was made to Sir Daniel Morris that a package of seeds, put up in the manner described, should be forwarded to Kew. A box containing 200 seeds was accordingly sent by parcel post from Dominica, and arrived at Kew apparently in good condition, every one of the seeds having germinated on the way. A second supply of seeds packed in a similar manner was forwarded a few months later, and these also arrived in good condition, and practically all of them germinated.

The outcome of this packing experiment is that cacao beans, selected, prepared, and packed as above described, can be sent from the West Indies to England, and probably much farther, and that about 70 per cent. of them are likely to produce healthy plants.

INSECT NOTES.

Practical Remedies for Insect Pests.

The article reprinted below, dealing with measures for the destruction of insect pests affecting agricultural crops, is from the pen of Mr. H. Maxwell-Lefroy, formerly Entomologist on the staff of the Imperial Department of Agriculture, and now holding a similar position under the Government of India.

Although some of the insects referred to by Mr. Lefroy are not found in the West Indies, yet many of the remedial measures recommended are of general utility, and are reproduced as illustrative of lines of treatment that may with advantage be adopted in combating the ravages of insect pests in these colonies:—

The ultimate aim of the study of destructive insects is the discovery of some feasible method, whereby their increase and destructiveness may be checked and crops preserved from their attacks. In such a quest, not only must the habits and characteristics of each individual pest be considered, but it is of equal importance to take into account the conditions under which the crop is grown, and the facilities there are for adopting any method of repression. It is probable that the scientific methods that appeal to the skilled farmer of European countries will be of little value when applied to the conditions of Indian Agriculture, and the best method that science reveals can scarcely be regarded as suitable to the present problem. In very many cases, the habits of a pest are such that practically nothing is possible unless we can utilize the most up-to-date methods. In others, a weak point can be found in the life of the pest when it can be successfully attacked by some very simple means. Given some such simple remedy, thorough co-operation in its application over some area is usually also necessary, and this is perhaps to be obtained only when an unusual abundance of a pest awakes the cultivator to the necessity of some action, and, with a little pressure, a fair trial can be given to the remedy. Experience has shown that, for some pests, there are such simple remedies as can be applied by an individual cultivator, and it is chiefly these it is proposed to discuss here.

One instance is the very simple method of checking the stem borer of cotton, where the withered plants which contain the pest can be removed and burnt with the pest within. The emerging beetle is not a wide-ranging insect, and is apt to confine its ravages to a small area; the destruction of the withered plants in a cotton plot does much to protect that particular plot, and though joint action over a large area would be far more effective, even a small plot may be largely protected.

The red bug of cotton is a pest that yields to the simplest of all methods, destruction by hand; so also the very common dusky bug, which often swarms in cotton bolls, can be checked by the simple precaution of removing all the bolls that are worthless at the same time as the round ripe bolls are plucked. It is unfortunately a general practice to leave on the plant those bolls which have been so damaged by boll worm as to be not worth plucking; the dusky bug finds there a secure breeding place where it may lay its eggs, and where its young can obtain food from the uninjured seeds; from these breeding places it spreads to other bolls and in them it sucks the seeds, rendering them useless for sowing or oil-extraction. The removal of all such bolls is a simple and effective means of preventing the feeding of this pest. In cases where dusky bug is very abundant, a further simple method is valuable; the bug collects in the bolls in great numbers and, when disturbed, runs out and falls to the ground. The great number of these can be destroyed by tapping the boll while a pot of water with a film of kerosene over is held below the boll: practically all the bugs fall into the water and are killed, and an infested field can be very rapidly cleared.

Among the minor pests of cotton that are occasionally very injurious is the leaf roller, a green caterpillar that rolls up the leaf into a funnel and lives inside. This pest commences when the cotton (if sown with the first rain) is about a month old; the rolled up leaf is very characteristic and an infested plant has a peculiar appearance due to the unnatural position of these leaves. Every one of these leaves can be picked off with the caterpillar in, and if the work is done early, the first brood can be so thoroughly checked that very little remains to be done. If the first brood is missed, the increase is so great that a vigorous crop will be completely stripped later in the season, and it then becomes a far harder task. Were labour an expensive item, spraying with an arsenical poison would be the simple remedy, and both have been in use on the Pusa Experimental Farm. As it is, we have here a case that particularly applies to our conditions, and one that is within the reach of any cultivator.

A pest that is constantly reported from cane-growing districts is the moth borer. The principal remedy for it is to cut out and remove all the shoots which die in the young canes and which have the insect in them. In many sorghum-growing districts, especially in the Central Provinces and Bombay Presidency, this insect hibernates in sorghum plants, and the caterpillar is constantly found in the stumps left in the ground after the crop is cut. The removal of these stumps is a very valuable remedy, since it removes the pest when it has no other refuge and destroys the insects that would otherwise do much harm later in the season. This is a practical measure well worth impressing on cultivators; they know the insect, they can be shown it in the sorghum stump, and though they do not understand its transformation, yet they are open to the common-sense suggestion that these insects will increase later on, and attack their crop.

Most of these remedies are plain common-sense methods, and if we could find such points in the life of every pest, we would be able to deal more effectively with the problem. Apart from their value as remedies, the methods of treatment mentioned are valuable also as demonstrations; if a start can be made by demonstrating such simple remedies, and the agriculturist can be induced to take them up at times when the losses from the pest are fresh in his mind, the foundation for further work in checking preventible loss will be laid. It is astounding how universally the simplest remedies are unthought of by the cultivator, apparently because the question of checking pests never suggests itself until the overwhelming numbers of a caterpillar or grasshopper make a practical remedy an impossibility. In very many cases, if the possibility of checking an insect was known to the crop grower, he would from his own intimate knowledge of his crops, be able to prevent or check much of the loss that constantly occurs.

(To be continued.)

AGRICULTURAL SCHOOLS.

In December last the pupils of the Dominica, St. Lucia, and St. Vincent Agricultural Schools underwent the usual half-yearly examination by Mr. F. A. Stockdale, B A., F.L.S. Below are given the general reports of the examiner on the work done at the respective schools:—

DOMINICA.

Twelve pupils sat for the examination. Eleven were juniors and one was a new boy.

Of the more important subjects, Arithmetic came out best, but the working out of the various questions was not as clearly given as could be wished for. Attention should be given to this point, and careful supervision over the whole class is necessary. The answers submitted in the science subjects were very uniform, and showed that the pupils had a fair elemetary knowledge of the principles of agricultural science Some slight improvement has been made in these subjects since the last examination, and it is satisfactory to note that few careless blunders were noticeable in the present examination. There is, however, still room for improvement in all the subjects. Geography has improved slightly, but some of the papers were poor. Extra time might profitably be given to this subject during the coming half-year. The Composition and Dictation were fair. Some slight advance has been made in grammatical construction. The writing and neatness of the whole class were generally satisfactory.

The new boy sent in some promising answers. His Arithemetic was good.

ST. LUCIA.

Seven pupils took the papers set for the senior class, ten those for the junior, and there were two new boys. Papers from three candidates for admission into the school were also submitted.

The work of the senior class was fairly satisfactory. Some improvement has been made in Agriculture and in Chemistry. The Botany is only fair, while Geography is particularly weak. These last two subjects should receive careful attention for they have been rather weak for some time. Geography, although special attention was called to it in the last examination, has shown no improvement. Extra time might profitably be given to this subject.

The junior class, as a whole, is fair. Agriculture is still rather weak, particularly with some of the lower boys. Chemistry has improved considerably since the last examination but Botany should receive further attention. Geography was very poor. Arithmetic has maintained the improvement shown at the last examination, but greater neatness could have been wished for. Composition and Dictation have shown some slight improvement.

The new boys' papers were fair, their Arithmetic being quite promising.

The papers sent in by the candidates were very interesting, as they may, I suppose, be taken as good examples of the raw material sent to the school. The best of the three could only obtain 29 per cent. of the total marks for Agriculture, Arithmetic, Geography, Composition, and Dictation.

ST. VINCENT.

Five boys took the papers set for the senior class, twelve those set for the junior class, and there were four new boys.

The science subjects are, on the whole, satisfactory. The improvement shown in the last examination in Agriculture and Botany has been maintained; many of the answers sent in were of a high standard. It is satisfactory to note, also, that considerable improvement has been made in Chemistry, a subject that had been rather weak at the two last examinations. Attention should, however, continue to be given to this subject in order that the improvement made may be maintained, and that the few pupils that are still weak may be given careful instruction. Arithmetic is fairly good, but it is not quite so satisfactory as in the last examination. Many careless blunders were made.

Of the less important subjects, the Composition and Dictation papers were generally satisfactory, but Geography is still weak. In the last report it was mentioned that Geography should receive careful attention, and I would now suggest that extra time should be given to this subject, as improvement will be looked for at the next examination.

CASSAVA ROOTS AND STARCH MANUFACTURE.

A pamphlet (*Bulletin No. 106* of the Bureau of Chemistry) has been issued by the U.S. Department of Agriculture dealing with the properties and uses of cassava.

Apart from food purposes one of the chief uses of cassava is in the manufacture of starch. It will be remembered that cassava starch manufacture has been on trial in Jamaica for some time past (*Agricultural News*, Vol. V, p. 410), and it is now being produced at three centres. This starch is of considerable value, and if well made, commands a price of from £15 to £16 on the English market. In the trials carried out at Hope Gardens to ascertain the starch-yielding values of different cassavas, a return of 4 tons of starch per acre was obtained, after twelve months' growth, from the best varieties.

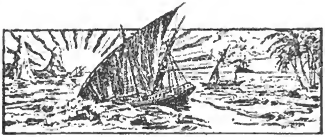
Since cassava tubers deteriorate rapidly on being harvested, it is advisable, when intended for starch manufacture, that they should be grown as near the mill as possible. The grower who lives in close proximity to the factory is therefore at an advantage as compared with the grower who lives at a distance. Some practical method of treatment of the roots which would do away with the necessity of immediate utilization would confer a great benefit upon cassava cultivators, and experiments of this kind undertaken by the U. S. Department of Agriculture, are described in the pamphlet.

Briefly, these experiments consisted of grinding the tubers to a fine meal and drying in the sun. The cassava meal so prepared is reported to have kept for eight months without signs of deterioration. This means that the product can be stored and marketed to much better advantage, while owing to the great decrease in weight (about 50 per cent.), as the result of moisture evaporation on drying, the cost of transport is reduced by one-half.

The mill used in grinding the roots was of very simple construction, and cost complete no more than $10. Such a machine would therefore be within the reach of growers producing cassava on only a small scale. It ground 1 ton of tubers in one and a half hours.

The drying trays used in exposing the ground cassava to the sun, in order to evaporate the moisture, consisted of a wooden framework with a canvas bottom. They were 5 feet long by 2½ feet broad, and were made very cheaply. The cassava meal was occasionally stirred in the process of drying.

Should the cassava starch industry of Jamaica develop, as it shows every promise of doing, the above method of preparation and preservation might be worthy of adoption by growers in certain parts. In the West Indies it would be possible to completely dry and bag the cassava meal on the same day as the roots were ground.



GLEANINGS.

During the year 1906, twelve grants of Crown land were taken up in British Honduras, the whole comprising an area of 716¼ acres. The cost of Crown land in British Honduras is $1 per acre.

One hundred and thirty-one grants of Crown land were made in British Guiana during 1906-7. These comprised a total area of 3,571 acres. Thirty-two grants were of 5 acres and under.

The *Port-of-Spain Gazette* reports that from the beginning of the cane-reaping season up to February 29 last, cane farmers in the southern district of Trinidad had supplied the factories with 29,500 tons of cane, valued at $60,200.

The introduction into Papua, New Guinea, of rabbits, hares, foxes, monkeys, or any animal other than useful domestic animals, has been forbidden under heavy penalties. (*Papua Government Gazette.*)

Over 1,600 budded citrus plants, chiefly of the Washington Navel orange, were sold from the Dominica Botanic Station and Agricultural School during 1906-7. It is reported that there is a steady demand for these plants.

The output of balata in British Guiana during 1906-7 reached 637,040 lb., a considerable increase on the figure for 1905-6. Prices are good, and the latest report (1906-7) on the colony estimates the present year's production to be still higher.

The want of good transport facilities has long prevented the utilization of the best agricultural land in British Honduras. The railway that is about to be laid in the Stan Creek Valley, however, will open up one of the most fertile districts.

A number of Mangosteen plants (*Garcinia Mangostana*) are now established in Dominica, three of which are at the Botanic Station. It is stated that this plant grows best on fairly heavy soils, and in districts where the rainfall is well over 100 inches per annum.

His Majesty's Consul at Palermo reports a good crop of citrus fruit (oranges and lemons) for the present season in Sicily. The fruit is small, but the return is more abundant than last season. A new company has just been formed for citrate of lime manufacture.

The U.S. Consul at Calcutta, in a late report, draws attention to the great loss of cattle from disease and other causes, that took place in the Madras province during the three months ending June 30, 1907. The total loss is placed at 23,801. Of these, 12,778 died from rinderpest, 1,979 from anthrax, while 2,789 were killed by wild animals.

The amount of sugar-cane products shipped from St. Kitt's-Nevis during 1907 reached 14,179 tons of sugar, 2,155 puncheons of molasses, and 300 puncheons of rum.

It is satisfactory to note that the exports of cacao from Jamaica during the past year show a greater increase than those of any other product. The amount of cacao shipped in 1906-7 was greater by 16,500 cwt. than the shipments of the previous year, this being equal to an increased value of £57,000.

The *Voice of St. Lucia* comments on the great extent to which donkeys are used in Barbados as compared with other West Indian islands. It points out that these animals would be most useful to small cultivators in St. Lucia, especially in the more hilly districts of the interior, and suggests that the Agricultural Society might start a movement to promote the breeding of donkeys on organized lines in the island.

The Tahiti or Persian Seedless has been reported on as the chief variety of lime grown in Cuba. This is described as a prolific variety, the fruit containing a good percentage of citric acid, but not having good keeping properties. There are, too, a considerable number of native varieties of limes grown in Cuba, and growers of these report that the produce is of excellent quality.

The Jamaica Board of Agriculture has recommended to the Government, that the provision of school gardens shall become compulsory in connexion with all the elementary schools of the colony. The *Jamaica Telegraph* approves this step, but expresses an opinion that the best results will only be obtained if the Agricultural Instructors of the island undertake the instruction work connected with the school gardens.

Several varieties of cassava have been grown experimentally at the Agricultural Experiment Station, Bahamas. Part of the crop was raised after nine months' growth, the remainder being taken up twelve months after planting. In all cases the most profitable results were obtained after twelve months' growth. In the case of two varieties, White Top and White Stock, the return after twelve months' growth was greater by 7 tons per acre than after nine months' growth.

The Agricultural Instructor of St. Ann and Trelawney, Jamaica, reports that the people of the Deeside district are showing very considerable interest in the possibility of the establishment of jippi-jappa hat manufacture in their midst. The Instructor has been requested to get all the information possible on the subject, together with a stock of plants for establishment in the district, so as to ensure a steady supply of straw before starting operations.

Raw lime juice to the extent of 234,238 gallons was exported from Dominica during 1907. This shows an increase of 60,700 gallons as compared with 1906. Of concentrated lime juice, 126,800 gallons were shipped during 1907 a small increase on the shipments of the previous year.

Sisal hemp (*Agave rigida*, var. *sisalana*) and Mauritius hemp (*Furcraea gigantea*) are now being largely planted in many parts of Queensland. The agricultural report on the colony for 1906-7 states that these plants thrive luxuriantly on the coast lands, and there appears to be every indication that Queensland will become an important centre for the production of sisal fibre.

DOMINICA: REPORT ON BOTANIC STATION, AGRICULTURAL SCHOOL, AND EXPERIMENT PLOTS, 1906-7.

This report, the interest of which is increased by the inclusion of twelve photographic illustrations, opens with an account of the establishment and subsequent history of the Dominica Botanic Station. From this it appears that Botanic Gardens were established on the present site in 1891. The present Curator, Mr. Joseph Jones, was appointed in 1892.

The efforts made by the Imperial Department of Agriculture to develop the agricultural industries and advance the agricultural interests of Dominica are also described in the report. Since 1898 the Imperial Department has maintained the Botanic Station by means of an annual grant. The Dominica Agricultural School was started in 1900, and this also has been kept up by the Department. Lectures and demonstrations on the principles of agriculture have been given to head teachers in the elementary schools of Dominica by officers of the Department, in order to fit these masters to give agricultural instruction to the pupils of their schools, and to undertake the management of school gardens.

The work which the Dominica Botanic Station has been enabled to carry out as a centre for the growth and distribution of economic plants has undoubtedly been of the greatest value to the planting community of the island. The average number of plants distributed from the Gardens each year from 1902 to 1906 was 55,726, with a total of 283,631 for the whole period. These consisted chiefly of limes and cacao. Large numbers of rubber seeds and plants have also been supplied from the station. An important branch of work, too, has been the raising and propagation, by budding methods, of citrus fruits and mangos. More recently, interesting experiments in grafting cacao have been made at the station. Useful experiments in connexion with the manurial requirements of cacao have also been in progress in Dominica during the past few years, under the direction of the Imperial Department of Agriculture.

The organization and institution of agricultural shows, the establishment of Permanent Exhibition Committees, and the introduction of improved cacao driers—which have also proved useful in drying citrate of lime—may be mentioned as other means by which the Imperial Department has endeavoured to assist the agricultural industries of Dominica.

With reference to the work of the year under review, it is stated that the total expenditure in connexion with the Botanic Station amounted to £779 17*s.* 5*d.*, while the receipts from the sale of plants and produce amounted to £252 3*s.* 11*d.* The number of plants distributed during 1906-7 is the largest recorded in any year since the station was started, the total number being 83,505. This represents an increase of nearly 18,000 over the previous year, which is mainly due to the enormous demand for cacao and lime plants.

The experiments with spineless limes and grafted cacao at present in progress at the station, and of which details are given in the report, are of especial interest. In connexion with the lime experiments, results are tabulated, showing the relative percentage of juice and of acid in the juice, of the spineless lime, as compared with the ordinary variety. Interesting results have been obtained in the manurial experiments with limes at St. Aroment

As regards the Agricultural School, work has progressed satisfactorily during the year. The expenditure on the school during 1906-7 was £590, while £26 14*s.* were received from the sale of plants, honey, etc. Apart from the school lessons, the boys receive practical instruction out of doors in general cultural operations, and budding, grafting, pruning, etc. are also taught.

VIRGIN ISLANDS: ANNUAL REPORT ON THE EXPERIMENT STATION, 1906-7.

An account of the establishment of the Tortola Experiment Station in 1900, under the auspices of the Imperial Department of Agriculture, appears at the commencement of the report. The Department purchased an old sugar estate, on which considerable improvements have been made, buildings erected, a well sunk, etc. About 46 acres of this estate were afterwards let out to small holders, and about 14 acres reserved for the station proper. Many improvements have been effected on the site; roads have been laid out, a well sunk, and an aermotor erected for pumping water. The station has since been laid out in plots of 1 acre, and planted with various crops, such as seedling canes, limes, pine-apples, cacao, coffee, etc., for experimental purposes.

The report also contains a summary of the efforts made by the Imperial Department, during the past ten years, to improve the condition of the agricultural industries of the Virgin Islands. During this period the cotton industry has been re-introduced, and the cultivation of this crop has been of special benefit in Virgin Gorda and Anegada, where little else can be grown. Further, the suitability of certain districts of Tortola for the cultivation of cacao has been demonstrated, and some plots have been planted with this crop, and improvement has been effected in the local breeds of stock by the introduction of animals of superior type, such as members of the woolless breed of sheep, and Toggenburg goats.

The work of the Agricultural Instructor, both at the Experiment Station and by means of visits to outlying districts for the purpose of giving information and advice has been of value to the agriculturists of the Virgin Islands.

The total expenditure on the Experiment Station during 1906-7 was £609 7*s.* 1*d.* The receipts from the sales of produce, amounts paid in towards the purchase of land, etc., amounted to £47 17*s.* 7*d.* The figures given in relation to the cotton industry show that an estimated profit of £125 11*s.* 3*d.* was made during the year under review. Experiments made at the station seem to indicate that May and June are the best months for planting cotton in Tortola.

The value of the cotton and seed shipped from the Virgin Islands in the 1907 season is estimated at £400, an increase of £135 on the shipments of the previous year. As mentioned in a recent number of the *Agricultural News* (Vol. VI, p. 395), samples of cacao produced in Tortola were at the end of 1906 submitted to dealers in London. From the report received it would appear that cacao of good quality can be grown in the island.

The seven reproductions of photographs with which the report is illustrated will assist in giving some idea of the work that has been done at the station.

RUBBER EXHIBITION IN LONDON.

The proposals that have been made to hold an International Rubber Exhibition in London during 1908 were mentioned in the *Agricultural News* of September 21 last (Vol. VI, p. 297). The initial suggestions met with such ready response from planters and manufacturers, as well as from Government officials in rubber-producing countries, and other persons interested, that the proposals have taken concrete form, and arrangements have already been made to hold the exhibition at the Royal Horticultural Society's Hall, London, from September 21 to 26 next.

The great success which attended the Ceylon rubber exhibition of 1906 led to the suggestion that such meetings should be held periodically, and the prospects for the London exhibition of the present year are certainly promising. The main object of the show is naturally to attract public attention to the great advances made by the rubber producer and manufacturer during recent years. Even since 1906 many new features and improvements have been introduced which are still unknown to many who would be interested.

The preliminary prospectus of the exhibition that has lately been issued contains a list of the various articles, materials, etc., for which classes will be provided. The large number of these classes indicates the extensive nature of the exhibition, which will cover the whole of the rubber industry, and include manufactured goods of every description, machinery used by manufacturers in the preparation of rubber goods, as well as all kinds of planters' accessories, such as tapping knives, latex cups, coagulating agents, presses, packing cases, etc. There will also be classes for crude and prepared rubber of every description, rubber seeds, and specimens of all known rubber-yielding plants.

Another interesting feature in connexion with the show will be the illustrated lectures and addresses, for the delivery of which the committee are making arrangements. It is hoped that planters and producers will attend these lectures, and by taking part in the discussions, assist in the interchange and dissemination of information on subjects connected with the rubber industry. A club-room will be arranged in the Exhibition Hall solely for the use of exhibitors and their friends.

The advantages of participating in exhibitions of the kind described are being realized in the West Indies, where Permanent Exhibition Committees have been organized in most of the islands to bring together representative collections of produce of the colonies, and forward them to suitable meetings of this kind in England and Canada.

Little can be expected in the way of rubber exhibits from the individual colonies of the West Indies, since in those islands in which the industry exists at all, it has advanced no farther than the experimental stage. The several islands and British Guiana, however, might well co-operate to illustrate, by a collective exhibit, the rubber-producing possibilities of this part of the British Empire.

At least three kinds of rubber trees are being grown in several of the islands, notably in Trinidad, Jamaica, Dominica, and St. Lucia, while British Guiana has, in addition, indigenous species of the *Sapium* genus.

There exists therefore, the possibility of preparing and forwarding an interesting collection to the London show. This might well consist of botanical specimens, seeds of native and introduced rubber plants, and also small or large specimens of rubber from such plants. The Permanent Exhibition Committees of the several islands should consider whether they might not, with advantage, lend their assistance in connexion with the exhibition, since even at this early stage of development of the West Indian rubber industry, it will be well to keep the possible resources of the colonies well before the London market.

It may be mentioned that the Advisory Committee of the Exhibition includes the names of Sir Daniel Morris, Mr. Algernon E. Aspinall (Editor of the *West India Committee Circular*), and Mr. H. Hamel Smith (Editor of *Tropical Life*).

BRITISH GUIANA AND THE AGRICULTURAL CONFERENCE.

In the course of their reply to the Governor's speech, the members of the Combined Court of British Guiana made the following reference to the West Indian Agricultural Conference of January last:—

> It is to be hoped that among the important results ensuing from the recent West Indian Conference at Barbados will be an enlargement of trade, not only intercolonially, but also with Canada, a country which seemingly has reciprocal inclinations in this direction. We shall look forward with much interest to the further holding of such Conferences, feeling assured as we do that much good will follow. We cordially unite in support of the suggestion to hold the next Conference in this colony, and any sum that your Excellency may deem fit to require us to vote will be most willingly considered

DISC PLOUGHS.

Disc ploughs are being successfully experimented with in parts of the West Indies, notably in Antigua. The uses of this implement were discussed in a short article in a recent number of the *West India Committee Circular*, from which the following particulars have been taken:—

> Disc ploughs are at the present time playing an important part in the cultivation of dry, arid soils by reason of their adaptability for breaking up and thoroughly pulverising land which is in a dry, hard condition, and preparing it to receive the first rains. It is a well-known fact that in many dry and hot climates the land has to be left unploughed until the rain has softened and prepared it for the share plough. This often causes serious delay in seeding, late crops, and sometimes failure, as the first heavy rains run off the land into the streams, instead of soaking into the soil. It has been proved by experience that the land ploughed in a dry state retains moisture for a much longer period than land ploughed in a wet condition. Among the many other advantages claimed for the disc plough in arid and hot climates are: (1) It is lighter in draught, due to the fact that it is carried entirely on wheels, which thus reduces the bottom and side friction to a minimum, while the revolving action of the disc blades also gives a lighter cut than the driving action of the share and coulter of the ordinary plough. (2) The wear and tear of a disc plough is also considerably less than that of an ordinary plough, as the life of a disc is about twelve times that of a steel share, while the cost is less than double. (3) For weedy lands, peat, or other soils infested with fibrous roots the disc plough is unsurpassed, as it cuts through and clears itself of all obstacles. In fact there is little land, except very stony, or very wet and sticky soils, which cannot be advantageously ploughed with a disc plough.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of January :—

The extension of the Christmas holidays far into the first week of the year, combined with the effects of stock taking, has been the means of reducing the actual amount of business done in January to that of a short month. The first drug auction, indeed, was not held till January 16, when, as might be expected, the offerings of goods were of a considerable extent, and the tone of the markets generally showed some improvement over that which prevailed at the close of the year. In the matter of West Indian products the following are the principal items :—

GINGER.

At the first spice sale on the 8th, no Jamaica was offered, and but a few packages of Cochin and Calicut, good, small and medium cut fetching 56*s*. 6*d*., and ordinary, part mouldy washed, 31*s*. None was brought forward in the following week, but at the auction on the 22nd, 250 barrels of Jamaica were offered and bought in at 75*s*. to 80*s*. for dull to fair washed, and 90*s*. for bold. Washed rough Cochin was also bought in at 38*s*. to 40*s*. It was stated that a large business had been done privately in Cochin during the week. At the last spice sale on the 29th, Jamaica was in slow demand, while Cochin and Calicut sold at steady rates, about 100 bags being disposed of.

NUTMEGS, MACE, AND PIMENTO

On the 8th, some 240 packages of nutmegs were offered and mostly sold at varied prices, the smaller sizes realizing firmer rates. Nothing of note occurred in this article for the remainder of the month. At the same sale about 80 packages of West Indian mace were disposed of at the following prices :—1*s*. 4*d*. to 1*s*. 5*d*. for fair pale, 1*s*. 3*d*. for pale and reddish, 1*s*. 1*d*. to 1*s*. 2*d*. for fair red, and 9½*d*. to 1*s*. per lb. for broken. Of Pimento, 3*d*. per lb. was the price quoted at the beginning of the month, with a decline towards the end to 2½*d*.

ARROWROOT

This article was in very slow demand, the quotation at the beginning of the month for good manufacturing St. Vincent being 2⅜*d*. At the auction on the 8th, some 800 barrels were offered, but none sold. For good Natal 1*d*. per lb. was asked : nothing of note in this article occurred later.

SARSAPARILLA.

In the early part of the month grey Jamaica was reported to be very scarce, but at the first auction of the year 6 bales of fair sound grey realized 1*s*. 9*d*. per lb., and sea-damaged 1*s*. 8*d*. It was announced that a further consignment of 18 barrels had arrived but not landed in time for this auction. Small sales of native Jamaica were made at the following rates : for common mixed yellowish and greyish 10*d*. per lb, and for sea-damaged 8*d*. For another batch of 11 bales 1*s*. 1*d*. was obtained for good tawny, while fair red sold at 1*s*., and yellowish at 11½*d*. Fair rolled Lima-Jamaica fetched 1*s* 7*d*. per lb, at which price 3 bales of coarse rough Lima were disposed of; while 11*d*. to 1*s*. 0½*d*. per lb. was realized for 7 bales of Ecuador. At the last auction on the 29th, Sarsaparilla was represented by offerings amounting to 63 bales, 60 of which were disposed of mostly at lower rates, 39 bales of grey Jamaica being secured at a reduction of from 2*d*. to 3*d*. per lb., on the price paid at the previous auction.

KOLA, ANNATTO, LIME JUICE, TAMARINDS, ETC.

At the sale on the 15th, some 48 packages of kola were offered and 2 of dark Jamaica sold at 3*d*. per lb., and ordinary at 1½*d*. which was the price obtained on the 29th, for 3 bags of mouldy and wormy West Indian. Nine bags of annatto seed were offered about the middle of the month, 7 of which were disposed of at 2½*d*. per lb. Towards the end of the month annatto was reported as being scarce, a very medium quality realizing 3½*d*. per lb. With regard to lime juice, it was stated towards the end of the month that some heavy orders had been placed on the London market and that 1*s*. 3*d*. per gallon had been paid for really good raw juice. On the 15th, 1 case, out of 10 offered of West Indian oil of limes, hand pressed, fetched 4*s*. 6*d*. per lb. At the same sale 4 barrels of sweet West Indian distilled oil of orange realized 7*s*., and 1 barrel of bitter orange oil, 5*s*. 6*d*. per lb. Two cases of West India distilled oil of pimento were also offered at this sale and bought in, 6*s*. being the price suggested as the probable value.

Cassia Fistula was reported as scarce in the middle of the month, no West Indian being on the market, and 17*s*. to 20*s*. being the quotations for East Indian. A week later, some 28 baskets of fair thin West Indian were offered, and all sold without reserve at from 12*s*. to 13*s*. Towards the end of the month the quotations for tamarinds sold, duty paid, were as follows :—First quality Barbados, 21*s*.; Jamaica, 20*s*.; Antigua, 18*s*. to 19*s*.; and East Indian from 12*s*. 6*d*. to 13*s*. At the auction on the 16, a sample bag of 11½ lb. of 'Cedron nuts' were offered as a trial sample, and being something out of the ordinary way attracted some attention, though they are by no means unknown in England. The tree producing them is the Simaba Cedron belonging to the Natural Order *Simarubeae*, and a native of new Granada. Their supposed cure for the bites of snakes brought them into notice in early times, and at one time they were favourably spoken of as a valuable remedy in fevers, and as a cure for toothache.

GINGER CULTIVATION AT JAMAICA.

The United States Consul at Kingston, in a late report, supplies the following particulars in reference to the cultivation of ginger at Jamaica :—

The requirements for the growth of the plant are a cool, equable temperature, a regular rainfall, an elevation of over 2,000 feet, and a rich clay loam soil. It is claimed that these conditions are found in the central districts of the island, the northern central, and, to some extent, the northern parishes. I believe no extensive acreage of ginger, grown by any single individual, at present exists on the island, its cultivation being almost exclusively confined to settlers who possess or rent land in small areas.

Since American capitalists have given such a boom to banana growing in Jamaica, many of these small settlers, it is said, have turned their energies in this direction also, hence the falling off in the ginger exports. Ginger is usually planted between April and June, and the crop is ready for picking between the following December and March. A Jamaican authority on the subject states that 'with seasonable weather and fair attention bestowed on the cultivation, the grower may calculate upon an average of 2,000 lb. of cured ginger per acre.'

MARKET REPORTS.

London,—March 3, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., February 7, 1908; Messrs. E. A. de Pass & Co., February 21, 1908.

Arrowroot—No quotations.
Balata—Sheet, 2/4; block, 1/7 per lb.
Bees'-wax—Good quality £7 15s.
Cacao—Trinidad, 76/- to 88/- per cwt.; Grenada, 60/- to 75/- per cwt.
Coffee—Santos, 30/- per cwt.; Jamaica, no quotations.
Copra—West Indian, £16 10s. per ton.
Cotton—St. Vincent, 19d. to 23d.; Barbados, 18¼d. to 19d.; St. Kitt's, 18½d. to 20d.; Montserrat, 18d. to 19½d.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—No quotations.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—4/6 to 6/6 per box.
  Oranges—Jamaica, 5/3 to 7/- per box.
Fustic—£4 to £4 10s. per ton.
Honey—20s. to 27s. 6d. per cwt.
Isinglass—West India lump, 2/4 per lb.; cake, no quotations.
Lime Juice—Raw, 1/2 to 1/5 per gallon; concentrated, £15 5s. per cask of 108 gallons; Distilled Oil, 1/10 to 1/11 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£4 to £4 10s. per ton; Roots, no quotations.
Mace—Quiet, no quotations.
Nutmegs—68's to 69's, 7d. to 9d.; 75's, 6d. to 6½d.; 105's, 4¼d.; 111's to 115's, 3¾d. to 4¼d.; 121's, 3½d.; 138's, 3¼d.
Pimento—2⅝d. per lb.
Rum—Jamaica, no quotations; Demerara, no quotations; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, 12s. 3d.; Molasses, 14/- to 14/6.

New York,—February 21, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 16½c. to 17c.; Grenada, 15c. to 15⅞c.; Trinidad, 16c. to 17c.; Jamaica, 13c. to 13½c. per lb.
Cocoa-nuts—Jamaica, select, $26·00 to $27·00; culls, $16·00 to $17·00; Trinidad, $25·00 to $26·00; culls, $15·00 to $16·00 per M.
Coffee—Jamaica, good washed, 8½c. to 10c.; good ordinary, 8¼c. to 8½c. per lb.
Ginger—7½c. to 11c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 50c. to 51c., dry flint; 27c. to 40c., dry salted.
Grape Fruit—Jamaicas, $2·50 to $4·00 per barrel.
Limes—Dominica, $4·25 to $5·50 per barrel.
Mace—30c. to 35c. per lb.
Nutmegs—110's, 9⅞c. per lb.
Oranges—Jamaica, no quotations.
Pimento—5¼c. per lb.
Sugar—Centrifugals, 96°, 3·67c. to 3·73c.; Muscovados, 89°, 3·25c.; Molasses, 89°, 3c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., March 17, 1908; Messrs. T. S. Garraway & Co., March 16, 1908.

Arrowroot—St. Vincent, $4·00 to $4·20 per 100 lb.
Cacao—Dominica, $16·00 to $17·00 per 100 lb.
Cocoa-nuts—$12·25 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$2·00 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—15c.; Fancy, 16c. per gallon.
Onions—Madeira, $3·50 per 100 lb.
Potatos, English—$1·40 to $2·25 per 160 lb.
Peas—Split, $6·20 to $6·50; Canada, $3·36 to $3·35 per bag.
Rice—Demerara, $5·60 to $5·65 (180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89° $1·90 per 100 lb. package included; Dark crystals, $2·25; Centrifugals, $2·00 to $2·30 per 100 lb.

British Guiana.—March 7, 1908.—Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 17c. to 18c. per lb.
Cassava—No stock.
Cassava Starch—$9·60 per barrel (retail).
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$5·00 to $5·25 per bag of 168 lb.
Eddos—$1·44 per barrel.
Molasses—Yellow, 19c.; Dark, no quotations per gallon.
Onions—Madeira, 4c.; Lisbon, 4c. per lb.
Plantains—20c. to 60c. per bunch.
Potatos,—English, $2·25 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $5·00 for good; Seeta, $6·00 per bag.
Split Peas—$6·20 to $6·25 per bag (210 lb.).
Tannias—$3·84 per bag.
Yams—White, $2·40; Buck, $4·00 per bag.
Sugar—Dark crystals, $2·20 to $2·25; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
——Cordwood $2·40 to $2·64 per ton.

Trinidad,—March 7, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$15·25 to $16·50 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—70c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·75 to $3·00 per 100 lb.
Dhal—$5·00 to $5·25 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 lb. (retail).
Potatos, English—$1·25 to $1·40 per 100 lb.
Rice—Yellow, $5·50 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$6·00 to $6·25 per bag.
Sugar—$5·00 to $5·05 per 100 lb.

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School Gardens.

IN dealing with the subject of Agricultural Education at the recent Conference, special attention was drawn to the progress made in establishing School Gardens in connexion with elementary schools in the West Indies and British Guiana. It was mentioned that at Jamaica, fair progress was being made in this direction. In 1900, only six schools received special grants amounting to £32. In 1906, the number of schools had increased to ninety-two, and the special grants to £227.

At British Guiana, three Government school gardens had been established at Georgetown. In addition, it was reported that the managers and teachers of over fifty schools had started small gardens in the country districts. These latter are stated to be earning about 80 per cent. of the small grant offered under the Code Regulations.

In Trinidad during last year, 203 schools were examined in practical agriculture. Steady progress is reported from all parts of the island. The formation of school gardens is stated to be hindered by the want of suitable land, and by other difficulties. Five horticultural school-shows are annually held in Trinidad and Tobago.

At Grenada, agricultural education in elementary schools appears to have declined during the last two years and nothing worth mentioning is being done at present with school gardens. Matters are practically at a standstill also in the elementary schools at St. Vincent. Moderate progress is reported from St. Lucia.

At Barbados, forty-one boys' schools and three girls' schools presented children at the annual examinations in object-lessons. About one-third of these had school gardens or showed plants under cultivation in pots or boxes. It is stated that the school gardens are decidedly better managed than before and the number has increased to twenty-one. The school exhibits at the Peasant Exhibitions reached a higher standard.

At Montserrat, five school gardens have been started, and it is reported that very good results have been obtained in the cultivation of various kinds of vegetables. Theoretical instruction is also given in school hours.

At Antigua, efforts have been fairly successful in introducing and encouraging the teaching of agriculture and the formation of school gardens. So far, school gardens have not been successful at St. Kitt's. On the other hand, at Nevis, they have had greater success, and at the Agricultural Shows the schools have always been well represented.

The Education Committee of the Conference reported that the evidence available from the different colonies testified that opposition on the part of the parents to their children working in garden plots has now practically died out. Lack of interest in agricultural teaching on the part of the teachers in some of the colonies is probably accounted for by the smallness of the grant allotted to this subject.

With the view of assisting in the work of establishing gardens for teaching purposes, a special pamphlet, entitled 'Hints for School Gardens, was issued by the Imperial Department of Agriculture in 1901. In this the hope was expressed that the time was not far distant when every primary school in the West Indies would include elementary agriculture in its curriculum, and that to all such schools a small garden should be attached where the pupils might learn by actual practice the best way to carry on the more important details of gardening work. This, it was considered, would afford a valuable opportunity of training the powers of observation of the pupils in a way not attainable by mere book learning, or even by watching the work done by the teacher.

In cases where a suitable area for a school garden was not available, it was recommended that the cultivation of plants in pots and boxes might be adopted as likely to supply, in part, the training obtained from school gardens.

In 1907 a new and enlarged edition of 'Hints for School Gardens' was published. As showing the considerable growth of interest that was taken in starting school gardens, this edition was exhausted within a few months, and now a revised edition (Pamphlet No. 52*), containing fifty-five pages and a plan, is placed within the reach of all who are interested in the subject.

In the introduction to the revised edition, it is stated that instruction in school gardens is not given merely for the purpose of showing how to grow vegetables, any more than the ordinary teaching in schools has for its object the winning of prizes. It derives its value from its usefulness in training the intellectual faculties, especially those of observation and correct inference, and its power to do this is the best indication of its true worth. Knowledge useful to the agriculturist is gained incidentally, and the material profit arising from the produce of the soil may be an incentive to painstaking efforts on the part of the learner.

Pupils should be put through a good course of box and pot culture, and should thoroughly master the principles underlying it before they are allowed to proceed to the cultivation of plants in plots. The latter is a repetition of the elementary work on a larger scale, but does not serve so well as a means of imparting knowledge connected with plant life, as its processes are not under such immediate control. Its main object is to show how the methods adopted in practice naturally have their foundation in ideas derived from careful and accurate observation, and to provide exercises in actual agricultural procedure. At all stages, the teacher should seize every opportunity of demonstrating the processes of nature, so that the course of instruction may include also facts concerning animal life, especially that of insects.

In the revised edition of the pamphlet, considerable attention is devoted to pot and box cultivation, and details are given in regard to the preparation of boxes and pots, the manner in which seeds are germinated, the necessity of water, air, and shade for young seedlings, the effect of the age of seeds on their germination, the use of plant food in the seed to the growing seedling, and the best means for raising plants from leaves and cuttings, the care of ornamental pot plants, and the treatment of plants with the object of producing flowers and fruit.

With regard to garden plots, full particulars are given as to selecting the site, preparing the ground, planting hedges, laying out plots, and the successive operations necessary to establish a well-equipped and successful school garden.

The latter part of the pamphlet is taken up in affording special instruction in regard to twenty-six of the principal vegetable crops grown in the West Indies. The concluding pages contain simple and useful hints in regard to the various processes of budding, grafting and training garden plants.

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* 'Hints for School Gardens,' Pamphlet Series, No. 52. Price 4*d.* Free by post, 5*d.* On sale by all agents of the Imperial Department of Agriculture.

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SUGAR INDUSTRY.

Cane Farming in British Guiana.

The Demerara *Argosy* of January 18 last contained the following note on cane farming in British Guiana:—

The villagers at several places on the East Coast are cultivating sugar-canes to a much larger extent than has been the practice with them in former years. As a rule the canes are sold by the villagers to the estate nearest them at a fair market price; but occasionally the estate may not be able to take canes at the time they are offered, and as this always causes the villagers inconvenience and disappointment, there is a desire on the part of some of them to start a mill for themselves. The East Coast villagers have at least one example to look to in their own district, of a small cane-mill giving its owner a very fair return for his labour and capital; and they are clever enough to see that such a mill as this, with a cheap and simple plant of machinery, capable of making muscovado sugar, is likely to pay better in the future than it has done in the past, owing to the yearly decreasing number of sugar estates with common process machinery. In a very short time the number of such estates which will be left promises to be too small to meet the local demand for muscovados, and it looks as if the small mills of the villagers have a promising future in store.

Mexican Sugar Industry.

A law has just been passed in Mexico raising the duty on imported sugar from 2½c. to 5c. per 100 kilograms (220 lb.). The object of this duty is to protect the growing sugar industry of the republic, and it will affect the United States more than any other country, since the value of the sugar imports into Mexico from the States during the first five months of 1907 amounted to $78,472, the total sugar imports for this period being valued at $90,162.

Some account of the Mexican sugar industry was given in the *Agricultural News* of August 24 last (Vol. VI, p. 259), and the figures then quoted indicated the continuous increase in the output that has been going on during the past few years. While the output in 1900 was only 75,000 tons, it had increased to about 115,000 tons in 1907.

It is stated in a recent U.S. *Consular Report* that the amount of foreign capital invested in sugar cultivation and production in Mexico is continually increasing, advanced methods of planting and harvesting are being introduced, and modern mills and refineries erected. It is evident, therefore, that still further developments may be expected in the near future.

A great deal of land in Mexico is suited to cane growing, and it is doubtless owing to the primitive methods of cultivation and manufacture employed, as well as to difficulties in the way of transportation, that the republic has not entered more largely into the sugar export trade. Great fertility of soil abounds in the Gulf States, and the rainfall is ample, being estimated at about 100 inches annually. In the inland State of Morelos, however, where the largest quantity of sugar is produced, irrigation is necessary, as is also true of cane lands on the Pacific coast. From 25 to 40 tons of cane per acre is said to be the average yield on the elevated lands, with from 40 to 60 tons in the lowlands.

There are already two or three modern sugar factories of considerable capacity in operation. One of the most important is at Tenxtepango, in the State of Morelos. This is capable of turning out 3,750 tons of sugar per annum Another factory, that of the Mexican National Sugar Refining Company, was started early in the present year. It contains a modern plant, equipped with the most up-to-date sugar-making machinery. The factory has a daily capacity of 125,000 lb. of sugar. The cane mill connected with this factory will be able to deal with 800 tons of cane a day, supplied from adjacent plantations.

Cane-sugar Industry of Brazil.

The conditions of the Brazilian cane-sugar industry were reviewed at considerable length in the *International Sugar Journal* for February last. The annual production of sugar in Brazil amounts to about 300,000 tons, or rather more than the annual output of the West Indies and British Guiana. At present, there are about 4,000 usines and open-pan factories at work in the republic.

The chief sugar-producing State is Pernambuco, which possesses 1,547 factories and turns out 156,000 tons of sugar each year. Bahia, however, is the State in which sugar manufacture has reached the greatest degree of perfection, practically all the mills containing facilities for double crushing. Large quantities of sugar are also produced in States of Alagoas and Sergipe.

The system of cultivation in vogue appears to be somewhat crude, excepting in the State of Sao Paulo, where more up-to-date methods have been adopted.

Planting takes place about March and April, and the canes take about fourteen to sixteen months to arrive at maturity, the reaping season coming from July to October.

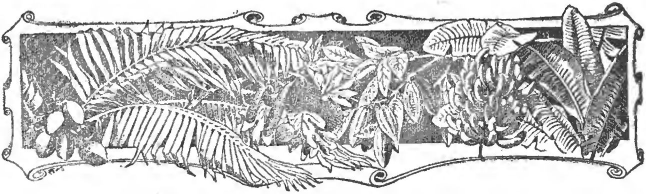
Ratooning is extensively practised in Brazil, as many as four crops being obtained from one planting in this way.

Use of Sugar in Bread Manufacture.

Several of the sugar journals have lately published articles dealing with the use of a small amount of sugar in bread manufacture. The *Sugar Beet* for January has a short note on the subject. Apart from the advantage claimed in this note, bread so prepared would, of course, have an additional food value.

The *Sugar Beet* says:—

In France every possible idea is being brought to the front with the view of increasing the home sugar consumption. At a recent meeting of the Sugar Chemists' Association at Bordeaux, a French chemist, Mons. F. Dupont, read a paper discussing the possibility of adding 7 per cent. of sugar to bread, and this without materially altering the taste of the latter product. An addition of 5 per cent. of sugar has no influence on the flavour. The chief advantage of this sugar addition is that the bread has greater keeping qualities. Bread which will ordinarily be sour in forty-eight hours, will undergo very little alteration, even after several days, when a slight proportion of sugar has been mixed with the dough.



WEST INDIAN FRUIT.

COLONIAL FRUIT AND VEGETABLE SHOWS.

Full particulars of the three exhibitions of colonial fruit and vegetables which the Royal Horticultural Society have arranged to hold in London during the present year, were given in the *Agricultural News* of December 28 last (Vol. VI, p. 405). The first of these shows has already taken place (March 5 and 6), and there now remain the June and November meetings. Some of the West Indian islands may find it possible to participate in the June exhibition, but in the majority of cases much finer collections of produce will be available in November, and it is greatly hoped that a general effort will be made by the Permanent Exhibition Committees of the several colonies, and that dealers and consumers in London will be enabled to see really creditable displays of fruit and vegetables from the West Indies.

In the course of a circular letter sent out, together with leaflets relating to the shows, to the Secretaries of the Permanent Exhibition Committies of the different colonies, Mr. A. E. Aspinall, Secretary to the West India Committee, says:—

From the enclosed leaflets you will see that the Royal Horticultural Society has responded to our suggestions, and is taking far more active steps to advertise the Colonial Fruit and Vegetable Shows than has hitherto been the case. There is to be a band, the hours of admission are lengthened, and the price is reduced.

It is hoped that several of the West Indian Colonies will organize exhibits for the show to be held on June 11 and 12, but it is on the show fixed for November 26 and 27 that we might, I think, with advantage concentrate our attention. Experience has shown that the cost to colonies participating in these exhibitions need not exceed from £15 to £20; the space is free, and the shipping companies consent to carry exhibits freight free.

In the circumstances I hope very much that your Exhibition Committee will co-operate towards securing a really representative exhibit. The exhibits from each of the colonies will be kept entirely distinct, and the awards will be made to the actual exhibitors. All that will be necessary for the Exhibition Committees to do will be to collect representative exhibits, to have them carefully put up, labelled, and packed, and addressed to me at the Royal Horticultural Hall, Vincent Square, Westminster, and we will then gladly undertake the necessary arrangements.

MANURES FOR PINE-APPLES.

The need for the application of large quantities of fertilizers in the cultivation of pine-apples is emphasized in an article in the *Florida Agriculturist*. This is on account of the fact that many soils, well adapted from the point of view of their situation and physical conditions to pine-apple culture, contain very little plant food. By the provision of the necessary constituents, however, the pine-apple will live, flourish, and give good crops for twelve or fifteen years.

Organic manures, such as cotton seed meal and dried blood, are preferable to nitrate of soda or sulphate of ammonia, for the supply of nitrogen. A little nitrate of soda may be given soon after planting, but it is stated, as a conclusion drawn from experiments carried out at the Florida Experiment Station, that the continued use of nitrate of soda or sulphate of ammonia, brings about a spiky condition of the plants, and results in the production of fruits of small size and poor keeping quality.

Basic slag appears to be the best phosphatic manure for the pine-apple crop. Bone meal also gave satisfactory results. Superphosphate was an unprofitable fertilizer, and resulted in an unhealthy condition of the plants with lessened fruit return. In the Florida experiments, however, it was shown that when the application of superphosphate was accompanied with a good dressing of lime, much better returns were given. This is what would be expected in view of the results obtained with basic slag.

A good supply of potash is also essential to the proper development and fruiting of the pine-apple. Sulphate of potash is recommended as the most suitable potassic manure, and as likely to produce better results than kainit, apart from the economy in freight observed in purchasing the former. The following is recommended as a good mixed manure suitable for the pine-apple crop: Dried blood, 735 ℔.; raw ground bone, 435 ℔.; and low-grade sulphate of potash, 925 ℔., making a total of 2,095 ℔. per acre.

The above is mentioned as a sufficient quantity for the first year's growth of the plants. Since a greater return of fruit will be expected in the second year, a heavier application of fertilizing constituents should be made. The quantity applied, in fact, should be in proportion to the return of fruit that may reasonably be expected. Under average circumstances, however, no more than 3,500 ℔. to 3,800 ℔. of manure can be profitably applied each year.

LIMES IN MEXICO.

The United States Consul at Manzanillo states that there is a large number of plantations in the Mexican State of Colima which produce many tons of limes that might be utilized for the production of lime juice or extract. At present, owing to the want of demand, the fruit rots on the ground. The Consul continues:—

The owners of these plantations would be glad to dispose of crops of limes at a nominal price, and contracts could be made for their gathering and delivery at a stated price. There is no lime industry in the State of Colima, and it seems that a good practical man could establish a large and profitable business here on account of the abundance of the fruit. Several attempts have been made to ship the limes to San Francisco, but these attempts, it is said, were unsuccessful, principally because the steamers called irregularly at Manzanillo, and the limes commenced to decay before reaching their destination.

BANANAS IN COSTA RICA.

A duty of one cent. on each bunch of bananas exported, for a period of ten years after 1910, has just been adopted in Costa Rica.

In connexion with the Costa Rican banana industry, the U. S. Consul writes:—

There seems no doubt that the export of bananas from the Port of Limon will reach 10,000,000 bunches per annum in the near future, as the productive area is steadily increasing, while the business is remunerative to the producer as well as to the exporting company, which is also a producer of about 40 per cent. of bananas exported. It is an attractive occupation, except for the fact that the bananas are chiefly grown in malarial districts, the lowlands aback of Limon being overflowed by the rivers almost every rainy season, receiving therefrom a rich sedimentary deposit which prevents the exhaustion of the soil. In localities lacking this advantage the productive capacity of banana plantations decreases annually, in many localities one-third in seven years. Trial shipments of Costa Rican bananas are now being made from England to continental ports, with encouraging prospects.

FRUIT TRANSPORTATION AND STORAGE.

Investigations into causes of decay of oranges during storage and shipment, as well as when on the market, have been continued during 1907 by the U. S. Department of Agriculture.

Summarizing the results obtained from all the tests, it is evident that sound uninjured fruit at the start, carefully gathered and packed with care, forms the basis of successful keeping quality under all conditions of handling and shipment. In the packing house, sound, unbrushed fruit developed an average of only 2·9 per cent. decay. On the other hand, brushed fruit showed 6·6 per cent., washed fruit 17·8 per cent., and mechanically injured fruit 10·1 per cent. decay. The necessity for washing is due to the occurrence of black scale on the fruit.

Shipping tests indicated that the amount of decay which took place during transport was proportional to the length of time that elapsed after packing and before shipment. Other conditions being equal, too, it was observed that the least decay took place in the case of the fruit that was packed and shipped in the coolest condition.

Sound fruit, handled throughout with sufficient care to prevent injury, and shipped quickly after picking and packing, in the coolest possible condition, are evidently essential for successful shipment. There appeared to be little difference in the keeping quality of sound oranges, whether shipped under ventilation, under ice, or after precooling.

GROUND NUTS IN THE UNITED STATES.

The increasing demand for ground nuts, and the greater attention that is being paid to the cultivation of this crop, are evidenced by the accompanying extract from the latest report of the Bureau of Plant Industry, U. S. Department of Agriculture:—

Owing to the greatly increasing field for the use of ground nuts, the demand has grown steadily during recent years and is now in excess of the supply. There are now four principal varieties of ground nuts extensively grown in the Southern States, and while the type of these varieties is quite satisfactory, there remains much to be accomplished through the selection and improvement of seed strains for maximum yield. The ground nut can be very readily improved by selection and proper culture, and the work undertaken is mainly along these lines. Experiments are being conducted to determine the oil-producing possibilities of the ground nut, although at present prices the extraction of the oil would not be profitable.

The use of the ground nut as a forage crop and stock food is being encouraged, and it has been demonstrated that the variety known as the 'Spanish' is best adapted to this purpose.

The greater portion of the labour of picking and handling ground nuts has heretofore been done by hand, but during the past two years great improvement has been made in mechanical lines, and the cost of production thereby decreased. Machines have been perfected which eliminate a large portion of the labour of picking, thus breaking the bond which held this crop to the limits of the labour supply.

USES OF TAMARIND SEEDS.

The Indian *Agricultural Ledger* (No. 2, 1907) contains a paper dealing with the composition and uses of the seeds of the Tamarind (*Tamarindus indica*), a well-known tree in the West Indies.

Analysis shows that the kernel remaining after the removal of the brown covering is rich in nutritive constituents. These kernels contain 18·06 per cent. albuminoids, 6·6 per cent. fat, and 62·88 per cent. carbohydrates. They have no disagreeable odour or taste.

Tamarind seeds are consumed as a food by the natives in certain parts of India, notably in the Madras Presidency and Central Provinces. For this purpose the outer skin is removed by roasting or by boiling in water, and the kernels are roasted and then ground into flour. This flour is, either alone or mixed with rice or other cereal flours, made into cakes for food. Disagreeable effects which sometimes follow eating these seeds are stated to be due to the fact that the husk has not been entirely removed. The tannin and fibrous matter of this husk are likely to produce unpleasant results.

In some districts of India tamarind seeds are regarded as having medicinal properties, and are given as a remedy for certain disorders.

Another useful property of the seeds of the tamarind is due to the fact that the powdered seeds boiled in a small quantity of water make a tenacious glue or size, which is used by wool-weavers, saddlers, and book-binders. This is used to dress country-made blankets.

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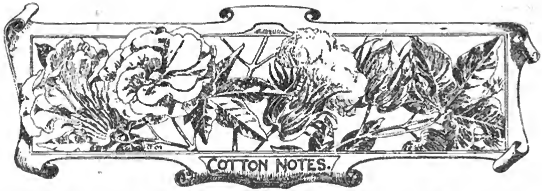

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date March 16, with reference to the sales of West Indian Sea Island cotton:—

Since our last report about 450 bales of West Indian Sea Island cotton have been sold, comprised of 170 bales St. Vincent, at 18*d.* to 20*d.*; 120 Montserrat, 20 Nevis, 60 St. Croix, 40 Barbados, 25 St. Kitt's, and 13 bales Anguilla, all at 17*d.* to 17½*d.* per lb.

SEA ISLAND COTTON MARKET.

In their report, dated February 29 last, on the state of the Sea Island cotton market, Messrs. Henry W. Frost & Co., of Charleston, write:—

With the continued absence of demand, the market remains at a stand, and nominally unchanged. In order to effect sales, however, factors would, we think, be willing to make considerable concessions from their asking prices

On March 7, Messrs. Frost write:—

With the continued absence of demand for the better grades, and only a limited demand for tinged and 'off' cotton, the quotations continue more or less nominal. A sale, however, has just been made, on private terms, of 200 bales tinged and 'off' cotton on account of the northern mills. There is also some enquiry for the better grades, but at prices much below the present views of the factors. Present prices are: Fully fine to extra fine, 35c. to 40c.; fine, 30c.; fully fine, but tinged, 27c.; fully fine to fine, but stained, 20c. to 24c.

COTTON INDUSTRY IN MONTSERRAT.

Some notes on the progress of the cotton industry of Montserrat appear in the 1906-7 report on the Botanic Station and Experiment Plots of the island. About 1,000 acres were under cultivation with this crop in 1906-7, and 160,000 lb. of lint were shipped, this giving an average of 160 lb. per acre.

The bulk of the crop was grown from local seed, but 1,770 lb. of selected seed was imported and sold from the Botanic Station.

The leaf-blister mite and the cotton worm were prevalent in 1903-4, but both pests are now being kept in check. In the case of the cotton worm this has been effected by the use of Paris Green. As a safeguard against the ravages of the leaf-blister mite all old cotton plants are destroyed before the season for planting the next crop arrives. Growers are also constantly reminded of the danger of attempting to ratoon old cotton plants, since as the result of the adoption of such a proceeding, the leaf-blister mite has a chance of establishing itself.

For the 1907-8 cotton season, orders were booked for 5,500 lb of selected cotton seed. Practically all the planters of the island used this seed. The number of peasant growers of cotton has increased during the past two or three years. In 1906-7 there were at least 150 of these small cultivators each of which grew less than an acre of cotton. For the 1907-8 season, about 170 peasant cultivators purchased selected seed, and it is stated that this probably represents about half the number of small holders that actually planted cotton.

COTTON INDUSTRY IN THE VIRGIN ISLANDS.

Since 1904, when the total value of the lint and seed shipped from the Virgin Islands was no more than £35, the cotton industry has undergone steady expansion, and the estimated exports of lint and seed for 1907 are valued at £400, this being an increase of £135 over the shipments of 1906. It is gratifying to note that a good proportion of this cotton is grown in Virgin Gorda and Anegada, where the soil is unsuitable to most crops. Marie Galante cotton is cultivated as well as the Sea Island, but it is recognized that the latter is by far the more profitable variety.

The Botanic Station Report (1906-7) states that there was a marked improvement in the quality of the seed-cotton of last season's crop. The cotton is purchased by the Imperial Department of Agriculture, and ginned at the factory established at the Experiment Station. This step on the part of the Imperial Department was necessary to the success of the industry, since the cotton growers are all peasants who could not afford to await the returns for their crop until the cotton had been sold in England, and the money returned.

At the Virgin Islands Experiment Station, during the past season, cotton was planted between the rows of lime trees, on an area of about an acre. The seed was planted about the end of June, the first cotton being picked about the middle of October. Very good results were obtained from this plot, 900 lb. of seed-cotton being gathered. Another plot of Sea Island cotton planted in August proved an almost complete failure. May and June have certainly proved the most suitable months for planting in the Virgin Islands.

The cotton plots at the Experiment Station have remained remarkably free from insect pests. Some few trees were infected, but not seriously, with aphides, but spraying with tobacco juice and soft soap water soon killed these pests. Up to the present there has been no appearance at the Station of the cotton worm, so disastrous in other islands, and very few cotton worms have been seen in the out-islands.

COTTON EXPORTS FROM BARBADOS.

The *Journal* of the Jamaica Agricultural Society for January last thus comments on the cotton industry of Barbados, and the value of the lint shipments, as compared with the chief exports from Jamaica:—

From October 1, 1906, to September 30, 1907, which is the cotton year, the total quantity of cotton shipped from Barbados (the produce of the 5,000 acres estimated to be under this crop) was 1,796 bales, containing 852,408 ℔. of lint, which, together with the cotton seed shipped, brought the total value of the cotton industry of Barbados to £76,876. The average price of the cotton works out at 1*s.* 8*d.* per ℔. That total is almost as much as the value of our [Jamaica] coffee exports; it is more than the total value of our orange exports for 1906-7, over a half more than the value of our exports of cocoa-nuts, and a great deal more than the value of our cacao exports for the last three years. In fact, we have in Jamaica only six items of export, which amount to more than the value of the cotton shipments from Barbados, viz: coffee, bananas, pimento, sugar, rum, and logwood. We have dry districts in Jamaica as large as the whole of Barbados; these districts are well peopled, and cotton-growing should make an ideal cultivation for the inhabitants.

AGRICULTURE IN ST. LUCIA.

The recently issued *Annual Report* (1906-7) on the colony of St. Lucia gives figures which indicate considerable progress in the cacao industry of the island during the last decade. Lime cultivation also shows signs of promise, while a start has been made with rubber and cotton. The exports of sugar show a considerable advance compared with past years. The following particulars are taken from the report:—

There was a marked increase in the sugar crop over 1905. The usine sugar exported was 5,441 tons, of a declared value of £51,689, as compared with 3,721 tons, of the declared value of £37,210, in the preceding year.

During the past ten years there has been a considerable fluctuation in the cacao crop. In 1897, calculating at 200 ℔. to the bag, 4,768 bags were exported. In 1900 the exports rose to 6,490 bags, but in the following year fell to 3,285 bags. In 1902 the exports reached 7,524 bags, and in 1905, 9,468, the highest record. The average for the five years from 1897 to 1901 was 4,865 bags, and the average for the next five years, from 1902 to 1906, was 8,045 bags. It will be seen, therefore, from these figures, that the cacao industry has been nearly doubled during the past ten years; but the progress of the industry has nevertheless been very slow considering the quality of land suitable for cacao in the possession of large and small proprietors. The attention directed this year to improvements in the methods of cultivation will have good and wide-spread results, especially among the peasant growers, as time goes on: while the great rise that has recently taken place in the price of cacao will be the strongest inducement to planters to extend their cultivation.

The lime industry made great strides and appeared for the first time as an export produce. Five hundred and seventy-one packages of limes and 12 packages of lime juice were shipped. The cultivation is being extended. Forty thousand lime plants were distributed by the Agricultural Department during the year.

Rubber also for the first time appeared as an article of export, a small quantity from trees of the *Castilloa elastica* having been shipped. This industry has not, however, been started to any extent, and must be regarded as being still in an experimental stage.

The cultivation of Sea Island cotton has not yet been taken up. Some few years ago, at the instance of the Imperial Department of Agriculture, an effort was made to induce local growers to start the industry, but the trial was made in a lukewarm manner and proved a failure, which has since exercised a discouraging effect on any further attempts. Owing, however, to the successful results that have been obtained in the neighbouring colonies, the desire to make another trial is manifesting itself, and it is hoped that this industry will soon again be started. There are large areas of cleared land, apparently well adapted for the cultivation, that are available for enterprise in this direction.

AGRICULTURAL PRODUCTS OF COLOMBIA.

From the account of the agricultural industries of Colombia, as given in a British *Consular Report* just issued, it is seen that coffee and bananas are the chief products of the republic. The coffee output had diminished of late years, but is again increasing. The export for 1907 is put at 800,000 bags, the greater part of which went to the United States. The beans of this Bogotá coffee, as it is known, are of an especially large size. Coffee production seems to be extending, and plantations devoted to the growth of this crop are receiving more care and attention than was formerly the case.

Bananas are stated to be largely cultivated in all the districts suitable for this crop. The export trade, which has largely developed, commenced about fifteen years ago. Since then the methods of cultivation have been greatly improved, and now the fruit commands the highest price on the New York market. In 1905 the number of bunches shipped from Santa Marta reached 863,750. The number increased to 1,397,388 bunches in 1906, while up to the end of August 1907, the bunches of bananas exported had already reached 1,315,715. It is expected that during 1908 the export will reach at least 2,500,000, and as a large area suitable for cultivation is now being opened up, a still further increase may be expected.

Minor agricultural products of Colombia are cacao, tobacco, and cotton. A few districts only of the country are suitable for cacao cultivation and the whole of the crop produced is consumed at home. Tobacco, cigars, and cigarettes are produced for home consumption and a small quantity of tobacco is also exported to Germany. Efforts are being made to increase the area of cotton grown, and the climate and soil of certain districts seem specially suitable for this production.

Rubber may probably form an important article of produce from Colombia. At present a certain amount of wild rubber is collected, and with the expenditure of capital, it is believed that a good trade in this product will be developed. One or two rubber plantations are being made chiefly of Ceara rubber (*Manihot Glaziovii*).

Divi-divi (the curved pods of the *Caesalpinia coriaria*, used for tanning) and also vegetable ivory, the fruit of *Phytelephas macrocarpa*, are exported in small quantities to Germany. Other vegetable exports are tolu, balsam, ipecacuanha, and quinine.

Panama hats form the only manufactured article exported from Colombia.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial discusses the progress that has been made of late years, in connexion with the provision and use of school gardens, in the different West Indian colonies. A revised edition of the pamphlet 'Hints for School Gardens,' has just been issued by the Imperial Department of Agriculture.

Notes on the cane sugar industry in British Guiana, Mexico, and Brazil appear on page 99.

It is hoped that the West Indian colonies will make a point of participating in the Exhibition of colonial fruit and vegetables that will be held in London in November next (page 100). A brief article on the manurial requirements of pine-apples appears on the same page.

The progress of the cotton industry in Montserrat and the Virgin Islands is briefly reviewed on page 102. Market prices for Sea Island cotton are practically at a standstill.

Particulars in regard to the present condition of the agricultural industries of St. Lucia, as well as those of the Colombian republic, will be found on page 103.

The concluding portion of Mr. Maxwell-Lefroy's article dealing with remedies for insect pests is given on page 106.

Agricultural Banks have lately been established under Government auspices in Cape Colony, Natal, the Transvaal, and in Western Australia (page 107).

Antigua Central Sugar Factory.

In connexion with the Antigua Central Sugar Factory, discussed in the last issue of the *Agricultural News*, and the question of the relative return of sugar obtained under the factory system, and by the muscovado method of manufacture respectively, it was mentioned by Dr. Francis Watts at the late Agricultural Conference, that the figures so far available indicate that 17 tons of cane were required to yield a ton of sugar on an Antigua muscovado estate, whereas, at the factory a ton of sugar was obtained from 10¼ tons of cane. As pointed out by Sir Daniel Morris in his presidential address, this difference would indicate that out of the 6,000 tons of sugar crystals shipped from Antigua, nearly 2,500 tons represent the gain due to improved methods of crushing and manufacture of crystals.

◆

Rubber in Colombia.

Extensive plantations of Castilloa rubber are reported by the U. S. Consul at Cartagena to be in course of formation in Colombia. At least 1,600,000 trees have been planted in different river valleys, but these are at present too young to have made much return. At present the Colombian output of rubber is chiefly from wild trees, and collected chiefly by Indians.

Rubber planters do not seem too sanguine as to prospective yields. One grower reported an annual return of 1,121 lb. of dried rubber from 14,155 trees, of eight years old. The trees were carefully tapped, and this yield would work out at no more than 4 oz. of rubber per tree per annum. Other planters, basing their expectations on wild rubber returns, assert that at least 1 lb. of rubber per tree per year should be obtained.

The total shipments of rubber from Cartagena in 1906 were 351,076 lb., and 300,696 lb. in the first nine months of 1907.

◆

Propagation of the Avocado by Budding.

The avocado is of comparatively recent introduction into Florida, but experiments in the propagation of this fruit by budding methods have been undertaken at the Experiment Station of the State for some years past. Success has attended these efforts, since a report dealing with the work done states that frequently as many as 75 per cent. of the buds have developed into trees. The method of budding is the same as that practised in the case of citrus fruits. It is recommeded, however, that the buds used should be rather larger than ordinary citrus buds. They should preferably be 1 inch in length, since small buds are frequently grown over by vigorous stocks. For wrapping the buds, waxed cloth is mentioned as giving better results than string. By adopting this method of budding, large, unproductive avocado trees can be made to give good returns. The trees should be cut down within 3 or 4 feet from the ground, and buds from a good stock inserted on the shoots which soon make an appearance.

Agriculture in Southern Nigeria.

The portion of the *Annual Report* (1906-7) on Southern Nigeria dealing with agriculture shows that the chief industries have made rapid strides of late years. The leading agricultural exports consist of cotton, palm oil, fibre, coffee, and shea butter (from *Butyrospermum Parkii*). In the Western Province of the Protectorate the area devoted to the cultivation of cotton, maize, cacao, and ground nuts has undergone considerable extension during the past year. It is stated that many districts are especially well suited for cacao cultivation. Ground nuts are commented upon in the report as a crop which should be more largely grown on account of its value as green manure. Experiments in the cultivation of tobacco, castor oil, bananas, and leguminous crops are in progress at the Botanic Gardens in the Western Province. From these gardens, too, it is mentioned that 26,000 plants, as well as a quantity of tubers, packets of seeds, suckers, etc., were distributed during the past year.

Rubber planting in Southern Nigeria appears to be proceeding apace. During the year 1,903 plantations of Funtumia rubber were made, consisting of 207,455 trees. Para rubber is also being planted in the Central Province. The methods of preparation at present generally adopted are somewhat crude, and much higher prices will be obtained for the rubber when improved methods have been brought into use.

Destruction of Fruit Fly.

The campaign against the fruit (or orange) fly that was carried on in Bermuda last season, where all fruit known to be in the least affected was rigorously destroyed, was described in a recent number of the *Agricultural News* (Vol. VII, p. 8). In addition to destruction of fruit, wholesale pruning of the trees was also undertaken, to prevent the bearing of fruit which would serve for the reception of the eggs of the fly. Latest reports from Bermuda state that good results have attended the work thus carried out, and while the islands were almost destitute of fruit, the flies also are reported to have almost entirely disappeared.

The *Kew Bulletin* (No. 1, 1908) describes a method of destruction of this pest, which, from the particulars brought forward, has given excellent results in experimental trials in the Australian colonies, where the insect has caused so much trouble. The remedy depends on the fact that kerosene oil appears to have a great attraction for the fruit fly, and on exposing shallow vessels containing kerosene among the branches of the trees, the flies were destroyed by hundreds in a short space of time.

This method of combating the pest is referred to by the *Kew Bulletin* as by far the most efficient at present brought to notice, but it must be remembered that by its means only the adult flies are killed, and that it would still be necessary to collect and destroy fallen infected fruit, with the object of killing as many maggots as possible.

Trinidad Meat Supply.

The fact that British Guiana now exports a considerable number of cattle each year, whereas a few years ago, they were imported into the colony in large numbers, leads the *Port-of-Spain Gazette* to suggest that efforts should be made, through the medium of the Government Farm and the Agricultural Society of the island, to render Trinidad less dependent on outside sources for the required meat supply.

The change was brought about in British Guiana by the imposition of a heavy duty on all imported cattle, a step which, however, is not recommended as the right one to adopt in Trinidad. The suggested course is that the Agricultural Society should each year offer cash prizes to any local breeder who turns out a number of oxen, fit for the butcher, and reaching a given standard of excellence. This practically amounts to paying a bounty on cattle raising, but since such an industry would be certain to be highly remunerative when once developed, it is not likely that such a system would become a heavy charge on the funds of the society.

In this connexion the *Gazette* comments upon what it regards as the mistaken policy of the Government Farm in annually selling off large numbers of useful animals, which either go out of Trinidad, or are at once sent to the butcher, instead of being used as the foundation of a superior stock of animals in the island.

Vanilla Plants in School Gardens.

In their efforts to extend the cultivation of vanilla in suitable districts and disseminate knowledge as to proper methods of curing, etc., the Jamaica Board of Agriculture sent an instructor to the parish of St. Elizabeth in October last, when the vanilla pods were ready to be gathered, in order to demonstrate the best methods to the growers.

In his report dealing with the work done, the instructor recommends that vanilla should not be planted under very tall trees, since it is often necessary to climb the trees in order to get at the pods, which frequently leads to breakage of the vanilla vines. More satisfactory results are obtained by planting under trees which do not grow too high, and which send out branches at a few feet from the ground. Grown in this way, the pods can be easily gathered without damaging the vines.

Vines were planted by the instructor in one or two school gardens, and instructions given to teachers and children as to methods of treatment. It is remarked in the report that it would be a good plan to introduce a few vanilla plants into all the school gardens of Jamaica. Cuttings of vanilla for such purposes may be obtained free from the Public Gardens, Kingston.

These cuttings are about 3 feet long, and should be planted in a wide hole about 9 inches deep at the base of suitable trees. About 18 inches of the cutting should remain above-ground, and be tied lightly to the tree.

It is important that a small quantity of manure be mixed with the soil used in filling the hole, and the earth should be firmly trodden down around the plant.

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INSECT NOTES.

Practical Remedies for Insect Pests.

The concluding portion of Mr. Maxwell-Lefroy's article (reprinted from the *Agricultural Journal of India*), dealing with methods of destruction of common insect pests, is given below:—

A familiar pest to cultivators in some parts of India, and also in other parts of the world, is the common white ant. Investigation up to the present shows that the destructive white ant of the plains is one species only; in some parts of the country it nests below ground, in others at the surface or it builds up mounds above the surface of the soil. Where the termites nest deeply as in the deep alluvial soils of the Gangetic and Indus plains, practical means of checking them are difficult to find; but where they nest at the surface, a great deal can be done to check them by the systematic destruction of the nests; the simplest method is to dig into the nest and pour in abundant boiling water; the sign of success is when the very large white queens are obtained, as they are found only in the nest itself, and if these are destroyed with as many of the smaller termites as possible, the termites cannot increase until they build up a new nest and rear a fresh queen. In some parts of India, there is no reason why any termite nest should be allowed to remain, and a little systematic effort by each village would keep the land practically free from this destructive insect.

Another common pest is the weevil whose grub tunnels in sweet potatos, rendering them wholly unfit for food. We have seen fields, where a crop has been dug, covered with potatos which were thoroughly infested and left to breed weevils, thus providing a plentiful supply of insects to infest other fields or the next crop. This might readily be avoided if these potatos were gathered and buried in a pit under a foot of hard trodden soil. It is only pure common-sense to take such a precaution and so prevent the multiplication of the insect to attack the next crop.

For some pest the bag and frame so extensively used in the destruction of the hoppers of the Bombay locust is a practical method. The surface grasshoppers do a very large amount of damage yearly among the young crops. They are flattened insects, white below, with the upper surface roughened and earthy in colour; they abound in the fields and hop out as one walks along. If a wide bag on a frame is run through the field fairly rapidly, the grasshopper, as it jumps up, is caught by the bag and swept up. At the end of each run the bag is twisted up and the insects are shaken into a corner and destroyed. In this way a large area can be rapidly and thoroughly cleared either before the crop is up or while the plants are still young.

The bag in its various forms is useful in many cases where its application is once understood, and it provides the most practical remedy against a fairly universal pest of rice, the rice bug. This is a slender green insect, which flies readily when full-grown; it emits the usual aromatic odour of its class, and an infested field may often be known by that alone. As the rice comes into ear, the bugs assemble there and suck out the milky juice in the developing grain. The grain then whitens and the ear has nothing in it when it comes to harvest. A light bag, 8 feet wide, run rapidly through the field, brushing the tops of the rice, sweeps up these bugs, and though some escape, the bulk are captured. A bag must be used, as the insects escape from a plain cloth, unless it is smeared with sticky matter; the bag is considerably more effective if first soaked in kerosene, or in an emulsion made by shaking up kerosene with sour milk. This method like the others mentioned above is in application on the Pusa farm, where ordinary coolie labour is employed: as soon as the bug is found the bag is used and there is no difficulty in checking this pest.

Rice is constantly attacked by another class of pest, which yields to simple treatment if that treatment is carried out over any area larger than a few acres. This pest is the stem borer, a caterpillar which eats up the centre of the growing shoot of the rice and kills it. The result is that each shoot withers, and as a single caterpillar in many cases attacks several shoots, the damage to the ripening crop is considerable. This form of damage is reported from practically every rice-growing tract in India; several insects are concerned which are all quick breeders, and of which two or three broods complete their life-history in one crop. For all these there is but one practical cure: that is, to pick them all out from the beginning. If the cultivator would learn that withered rice shoots contain a caterpillar which, if left alone, breeds and multiplies quite naturally, he might systematically pick out and burn all withered shoots. These are sufficiently easy to see, and it does not require much time or labour to go over some acres of paddy. Were this known to the cultivator, and were he to do it, we believe that no cases of destruction by these pests would ever be seen. In some cases, it is possible also to utilize another method, depending upon the fact that, like the moth borer of cane, the stem borer of rice spends the cold weather or hot weather when the crop is not growing, in the stubble. Where this stubble can be taken out and destroyed, it destroys those insects which live over until the next crop and then emerge to breed. How far the destruction of rice stubble is possible depends upon local conditions, but it is always a valuable safeguard.

It is perhaps needless to multiply instances of simple methods of destruction. For very many pests, the remedy is there to hand, namely, to destroy the insects when they first appear, and so to save the later destruction caused by their natural increase. We have cited cases enough to show that, in very many instances, there are simple methods by which the cultivator could materially lessen the losses caused to his crop by insects. It is perhaps needless to say that there are other cases where equally simple remedies could be devised *by the cultivator*, if he knew how his pests lived and multiplied. In most cases, the scientific study of an injurious insect shows what its weak points are, but to take advantage of them requires also a very thorough knowledge of local agriculture, which no one person can have for more than a limited area. The treatment of such pests must be a matter for the future, but there seems to be no reason why efforts should not now be made to bring home to the cultivator the facts regarding such simple pests as it is possible for him to cure, and thereby to open his mind to the realization of the fact that the knowledge of the pest's life-history is the first essential, and that, given this, it is often within his scope to devise some means of circumventing the enemy. The cases enumerated above are cited as being those in which there exists a simple practical remedy for a particular pest. If the cultivator can be induced to adopt one of these and so to lessen the damage to his crop in any one case, a great step forward will have been made.

AGRICULTURAL BANKS IN BRITISH COLONIES.

In further reference to the question of Agricultural Credit Banks, discussed in a recent number of the *Agricultural News* (Vol. VII, p. 49), the accompanying notes, taken from the *Journal* of the British Board of Agriculture for February last, and dealing with the progress of this movement in South Africa and Western Australia, should be of interest:—

An act has recently been passed in the Cape of Good Hope providing for the establishment of a Government bank, for the purpose of assisting the occupation and improvement of agricultural lands. The management is vested in a board of trustees appointed by the Governor, and a sum not exceeding £1,000,000 sterling may be advanced to them from funds of the Post Office Savings' Bank at not more then 4 per cent. interest.

Advances may be made by the board to farmers for the following purposes: (a) to pay off existing liabilities in cases in which the board approves of an advance for improvements; (b) to effect improvements, including (1) water storing and irrigation, (2) fencing, (3) clearing land for cultivation, (4) planting orchards and vineyards, and (5) farm buildings; and (c) for purchase of stock and plant. No advances are to be made except on the security of a first mortgage on land, and the amount is not to exceed two-thirds of the value of the property. No loan will be less then £50 nor more than £3,000. The rate of interest is not to exceed 5 per cent., and repayments are to be made half-yearly as may be agreed.

The *Natal Government Gazette* of October 22 contains a copy of an Act (No. 27 of 1907) authorizing the Government to assist persons engaged in agricultural and pastoral pursuits by loans, and to appoint a board of Commissioners for the management and administration of a fund created for that purpose. Advances may be made to farmers and landowners (a) to pay off existing liabilities; (b) to effect improvements, including water pumping, storing, irrigation, fencing, clearing land for cultivation, planting orchards, etc., and farm buildings; (c) for purchase of live stock and plant—on security of freehold or quit-rent land, land held from the Crown or land held under private lease if the landlord becomes a joint mortgager. Loans are not to be granted for less than £50 or more than £1,530. Applications for advances of £500 or under are to have precedence over those for a larger amount.

The Transvaal Government have also passed an Act (No. 26 of 1907) on very similar lines. The funds of the bank to the amount of £2,500,000 sterling are to be advanced from the Transvaal Guaranteed Loan, and a loan to any one person is not to be less than £50 nor more than £2,500, except for large agricultural or irrigation works, which may be specially authorized, in which case the advance may be increased to £5,000. The advance is not to exceed three-fifths of the value of the land.

The Agricultural Bank Act of Western Australia (No. 15 of 1906) provides for the issue of mortgage bonds for the purpose of providing funds for advances to farmers. The advances are to be made on the security of land, and are to be for the purpose of clearing, fencing, draining, or water supply, for paying off previous mortagages, and for the purchase of stock for breeding purposes. Up to £300 the advance may be to the full value of the proposed improvement, and further advances not exceeding £200 may be made to one-half of the value of the improvement; but for the purpose of paying off previous mortagages, the advance is not to exceed three-fourths of the improvements already made on the holding, and not more than £100 is to be advanced for the purchase of breeding stock.

It may be mentioned that many articles on the subject of Agricultural Banks have appeared in past numbers of the *Journal* of the British Board of Agriculture. The following may be specially mentioned: 'Agricultural Credit Banks' (May 1905); 'Village Banks in England' (June, 1905); 'Agricultural Loans in Queensland' (September, 1905); and 'Agricultural Credit in Germany' (March, 1906).

CANADA'S WHEAT-PRODUCING CAPACITY.

In view of the negotiations that have recently taken place in Barbados tending towards the establishment of a reciprocal trade arrangement between the West Indies and Canada, Messrs. H. R. Silver, Ltd., Commission Merchants of Halifax, in a recent trade circular issued by the firm, give the following particulars relative to the flour industry of the Dominion, which may be interesting to readers, :—

A large portion of the extra flours shipped from New York to the West Indies are Canadian flours.

Canada's wheat-growing area in the West is 171,000,000 acres in extent, of which at present only about 5,000,000 are under cultivation, producing last year 100,000,000 bushels of wheat. The Canadian West is capable of producing three billion bushels of wheat annually. At the present rate of increase it is estimated that in less than ten years' time there will be 10,000,000 acres in wheat yielding 200,000,000 bushels annually. Even at the present time Canada ranks tenth among the world's wheat-producing countries.

One hundred pounds of Canadian flour makes more bread of high quality than the same weight of any other wheat imported into Great Britain.

The grain crop of the Dominion of all kinds reached, last year, nearly 300,000,000 bushels.

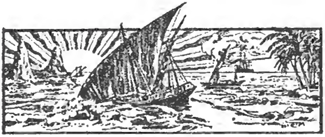
Canada ranked first in the world's display at the St. Louis Fair. One hundred and fifty varieties of wheat and other grains were there shown from Canada.

The daily capacity of the largest milling concern in Canada to-day is 14,500 barrels, or in other words, it can mill sufficient flour in thirteen days to supply British Guiana for one year. There are two other milling companies whose output is almost as large.

DOMINICA AGRICULTURAL SCHOOL.

The following is a copy of a note made by Sir Bickham Sweet-Escott, K.C.M.G., Governor of the Leeward Islands in the visitors' book of the Agricultural School on the occasion of a visit which his Excellency paid to the school on March 12 last:—

I visited this school on the 12th instant and am glad to record the pleasure which the visit gave me. I saw the boys at their work and inspected all the premises and grounds, which I found clean and well kept. I am satisfied that excellent work is being done at this institution, and I congratulate Mr. Brooks, the Officer-in-charge, on the good order which I found prevailing everywhere, and on the method of work adopted by him.



GLEANINGS.

The citrate of lime exports from Dominica increased from 36 tons in 1906 to 119 tons during 1907.

Seventy-nine grants of crown lands were made in St. Lucia during 1906-7. The total area alienated amounted to 1,197 acres. The cost of the St. Lucia crown lands is £1 per acre.

The Sisal hemp producers of Yucatan have formed themselves into a Joint Stock Company. The State of Yucatan has practically a monopoly of Sisal production, the annual output amounting to 600,000 bales of 360 ℔. each.

A recent report states that, in growing cotton, the native cultivators in Egypt usually manure their fields at the rate of 3½ cwt. of superphosphate and 1¾ cwt. of nitrate of soda or sulphate of ammonia per acre.

Over 1,000 bags of sweet potatos were shipped to British Guiana from Barbados by the schooner 'Comrade' on a recent date. The potatos commanded a price of 6*s.* 6*d.* per bag on the Georgetown market.

The present mango season in British Guiana is reported to be a record one and the market has been quite glutted by the unusually large supplies of fruit. Mangos were at one time selling as low as thirty for 1 cent. (*Demerara Argosy.*)

Tea-planting experiments are being carried on in the United States, under the direction of the Department of Agriculture, both in South Carolina and Texas. Laboratory experiments in regard to the aromatic properties of tea are also in progress.

On the pine-apple plantations of Porto Rico, the Red Spanish variety is planted in preference to any other, but it is stated that the Porto Rico or Cabazana variety is also extensively cultivated for canning purposes. The canneries, of which there are three or four, pay 50c. to 60c. a dozen for both these varieties, according to size.

School garden work is rapidly extending throughout the United States, according to the report for 1907 of the Bureau of Plant Industry. During the past year seeds sufficient to supply 36,173 flower gardens and 31,180 vegetable gardens were distributed to the schools by the Department of Agriculture.

The Jamaica Agricultural Society has sent a letter to the Imperial Commissioner of Agriculture expressing appreciation of the kind reception and treatment afforded the delegates of the Society at the late Agricultural Conference at Barbados, together with congratulations on the success of the Conference. The Jamaica representatives were the Hon. W. Fawcett, and J. R. Williams, Esq.

Owing to abundant rains, an excellent cane crop is reported from the coast districts of Mexico where this crop is grown. In the interior, however, rains have been scarce, and the cane crop of the dry districts is stated to be 30 per cent. lower than last year.

During the week ended February 20 last, 159,803 bales of cotton (including 39 bales British West Indian and 8 bales British West African) were imported into England. From January 1 to February 20, 1908, the number of bales imported reached 1,218,571 (including 1,590 British West Indian and 921 bales British West African).

Rubber is one of the most important products of Nigeria, and during 1906, the output amounted to 3,434,279 ℔., valued locally at £307,077. The chief native variety is Funtumia. The rubber, although prepared in a somewhat crude way, commanded a price of about 4*s.* 6*d.* per ℔. on the London market at a time when Brazilian Para was selling at 5*s.* 2*d.* per ℔.

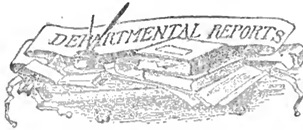
The first progeny of the West African rams imported from Lagos by the Imperial Department of Agriculture, in September last, were recently obtained in Barbados, as the result of a cross with the ordinary woolless sheep of the island. The lambs are considerably larger than would be the case if a ram of the local breed had been used.

The Hawaiian Sugar Planters' Association has for some time been carrying on experiments with seedling sugar-canes, and recent reports state that valuable results have been achieved. Over five thousand seedlings have been tested, but owing to the large number rejected, the actual number under trial at present has been reduced to 355. It is confidently expected that the work will result in the production of canes superior to any hitherto grown in the islands.

According to the *Tropical Agriculturist* Gambier growing is being taken up on a considerable scale on the east coast of Sumatra, where hitherto tobacco has been practically the only crop grown. The Gambier plant yields a valuable dyeing and tanning material, as mentioned in the *Agricultural News* (Vol. VI, p. 376), and attempts (hitherto unsuccessful) have been made to introduce its cultivation into the West Indies.

The 'red sorrel' or roselle, well-known in the West Indies, has come in for attention in the United States, where selection experiments have for some years past been carried on under the direction of the Department of Agriculture, with the object of producing a strain with especially large calyces, the calyx being the part of the plant used in making jellies and drinks. The 1907 report of the Bureau of Plant Industry states that a variety with calyces twice as long as the ordinary kind has already been established.

From the account of a French scientist who has recently been carrying out investigations on the subject, it appears that the tse-tse fly, which is responsible for the dissemination of sleeping sickness, seeks the vicinity of watercourses and the shelter of moist plants for the purposes of reproduction. Its larvae perish rapidly if exposed for a few hours to the rays of a tropical sun, even when they are covered by a thin layer of dry earth. This indicates that the spread of the tse-tse fly may be prevented by cutting down the coverts in which it lays its eggs.



MONTSERRAT: REPORT ON BOTANIC STATION AND EXPERIMENT PLOTS, 1906-7.

The Montserrat report for the past season has just been issued, and forms a brief history of the agricultural activities and progress of the island during the past ten years, and also gives an account of the present state of the planting and live stock industries. Reproductions of several photographs of the Botanic and Experiment Stations are included in the report.

The three agricultural experiment stations of Montserrat, at Grove estate, at Harris's Village, and at Olveston respectively, were all started in 1901. The first named is a Botanic Station as well as an experiment ground. The present Curator, Mr. W. Robson, was appointed in 1905.

The most important result of the efforts of the Imperial Department of Agriculture to improve the agricultural conditions of the presidency has been the successful establishment of the Sea Island cotton industry. Preliminary experiments were undertaken in 1901 and 1902, and in the following year many estate owners in the island made trial plantings. The present extent of the industry is indicated by the fact that while 98,262 lb. of lint were shipped in 1905-6, in 1906-7 the export increased to 160,000 lb. Manurial experiments with cotton have been carried out during the past three years, in order to ascertain the most economical method of applying fertilizers to this crop. Advice and assistance have also been given to peasant growers of cotton by the Curator of the Botanic Station and the Agricultural Instructor.

The existence of the Botanic Station, with its readily available supply of economic plants, has no doubt largely influenced estate owners and others to make experimental plantings of crops which otherwise would not have received attention. The station has distributed about 50,000 lime plants since it was established. The great majority of these were planted by small holders, but in one case a lime plantation of 50 acres was supplied from the station.

The attention of planters has also been drawn to the possible establishment of cacao estates in suitable districts of the island. Some small plantations have been started, and over 1,000 cacao plants were sent out from the Botanic Station last year.

The Castilloa rubber tree has been tried in the island, and will probably do well in certain parts. About 1,000 plants were distributed during the season.

Other crops under experiment are onions, Sisal hemp, broom corn, ground nuts, bay leaves, etc.

The efforts of the Imperial Department of Agriculture to improve the live stock of the island, by the introduction of male animals of superior type, has already been attended with considerable success.

In special reference to the work for the season 1906-7, it may be mentioned that the total expenditure on the Botanic Station amounted to £624 16*s*. 2*d*., while a sum of £54 14*s*. 7*d*. was received from the sale of plants and produce. The receipts show a gain of nearly £15 as compared with the previous year.

Altogether, 11,975 plants were distributed from the Botanic Station. These consisted chiefly of lime, cacao, Castilloa rubber, cabbage and bay plants. In addition a large quantity of seeds and cuttings were also sent out. The largely increased number of cacao and bay plants distributed, as compared with the previous year, is especially noticeable.

BERMUDA: REPORT OF THE BOARD OF AGRICULTURE, 1906-7.

The cultivation of fruit appears to be the industry holding most promise for Bermuda in the future, and two of the most interesting points discussed in the above report are the efforts made to promote a banana export trade with New York, and the steps taken to stamp out the ravages of the fruit fly.

The climate and soil of Bermuda are especially suited to banana cultivation, and by taking advantage of these natural conditions, it has been estimated that a large trade might be established with the United States. The first trial shipments of bananas made during the year under review gave promising results, but unfavourable weather interfered with the experiments, which had to be temporarily dropped, with the intention, however, of continuing the work in the near future.

An account of the thorough-going measures that were carried out in Bermuda during the past year for the destruction of the fruit fly is also given, in the course of a paper dealing with the fruit industries of the colony, prepared by the Superintendent of the Public Gardens, and reprinted in the report. A sum of £500 was put on the Agricultural Estimates of the year to provide the cost of the destructive measures adopted. These involved the entire destruction for the season of all fruit known to be liable to attack by the fruit fly, while the trees were severely pruned back, with the object of preventing them from bearing, so far as possible.

Sea Island cotton has been grown on an experimental scale in Bermuda, and a favourable report on the quality of the lint was received from the Imperial Institute, but owing to the uneven nature of the land, which entails the necessity for hand labour, and the high cost of labour as compared with the West Indian Islands, it is not thought that this crop will prove sufficiently profitable to warrant its general cultivation.

Experiments were carried out during the year in the cultivation of Sumatra wrapper tobacco, which it is believed would prove a lucrative industry in the colony. A sum of £700 to defray the cost of these experiments was granted by the Legislature. Fairly well attended lectures on the cultivation and curing of tobacco were also given at the Public Gardens by the Superintendent.

DEPARTMENT NEWS.

Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the Staff of the Imperial Department of Agriculture, left Barbados on March 31, by the R.M.S. 'Eden' for St. Lucia and Antigua, for the purpose of carrying out investigations into the fungus diseases of crops in those islands. Mr. Stockdale is expected to be away about three weeks, and will inspect the Agricultural School at St. Lucia, and the Botanic Stations at both the above-mentioned islands, in addition to paying visits to estates in the country districts.

BRITISH GUIANA AND WEST INDIAN AGRICULTURAL CONFERENCE.

At a general meeting of the Royal Agricultural and Commercial Society of British Guiana, held on March 18, the following resolution, relative to the holding of the next West Indian Agricultural Conference, was proposed by the Hon. B. Howell Jones, seconded by Mr. P. P. Fairbairn, Town Clerk of Georgetown, and unanimously carried by the members of the Society:—

> Whereas, since the establishment of the Imperial Department of Agriculture in the West Indies, Agricultural Conferences have been promoted and held by the Department, at Barbados, Trinidad, and Jamaica, at which delegates of this Society have been received and entertained:
>
> Be it resolved, that this Society cordially invites Sir Daniel Morris, K.C.M.G., to hold the next Conference in British Guiana, and promises to assist and support him in carrying out such a Conference, and will be happy to receive and entertain any delegates from the West Indian Islands who may be appointed to attend to represent the various Governments and Societies.

DOMINICA AGRICULTURAL SOCIETY.

An interesting meeting of the Dominica Agricultural and Commercial Society was held on February 29 last, under the presidency of Dr. H. A. Alford Nicholls, C.M.G.

Mr. A. R. C. Lockhart, delegate of the Society at the recent West Indian Agricultural Conference, presented his report on the Barbados Conference. A resolution was unanimously carried expressing the warm appreciation felt by members of the society for the efforts of the Imperial Commissioner of Agriculture in bringing about such a successful gathering.

The subject of lime cultivation was then discussed. A letter from Dr. Watts was read dealing with the question of mixing the juice of sour oranges with lime juice intended for concentration. As the result of experiment (See *Agricultural News*, Vol. VI, p. 340), it appeared that this was not a practice to be recommended. Juice of the wild lime, however, may be mixed with lime juice for concentration without harmful effect. The Bengal bean is frequently allowed to grow over lime trees in Dominica, since it appears that this has an influence in checking scale insects, but it was stated that in districts where the rainfall is heavy, the bean tended to kill the lime trees. Reference was made to weeding and forking under lime trees. Three weedings a year were generally regarded as sufficient. The hoe may be recommended for weeding under the trees on flat land, and the cutlass upon hill-sides. A good way to dispose of the weeds is to use them for mulching purposes. The beneficial effects of forking in the formation of a loose layer of surface soil, by which undue evaporation of moisture was prevented, were dwelt upon by Dr. Nicholls, but stress was laid upon the importance of care being exercised in forking, since it is so easy to cut and bruise the roots.

Mr. A. J. Brooks, Officer-in-charge of the Agricultural School, spoke in favour of nurseries for raising lime plants, as opposed to planting at stake in the field. Care and attention given in the nursery resulted in the development of better root systems on the young lime plants.

From figures brought before the meeting, it would appear that there are now 2,500 acres of lime trees in bearing in Dominica. In addition to this, 1,318 acres of trees have been planted, but have not yet arrived at the fruiting stage. As Dr. Nicholls pointed out, therefore, the output of limes and lime products from Dominica will probably be greatly increased within a few years.

A NEW METHOD OF EGG PRESERVATION.

An interesting method of preserving fresh eggs by means of desiccation has lately been put in operation in Sydney, New South Wales, according to the February *Consular Reports* of the United States. There appears to be no reason why the process should not become a success, in common with modern methods of preserving meat, milk, and fruit, and it should result in a considerable cheapening of this popular article of food.

The process was invented by a chemist of Victoria, Australia. The results obtained have been so satisfactory that the Farmers and Settlers' Co-operative Society, of Sydney, has erected an extensive plant for the manufacture, on a large scale, of 'egg powder.'

The following account of the process is taken from the *Consular Report*:—

> The process is as simple a one in principle as that of preserving fruit by sealing it hermetically at a boiling temperature, or of pasteurizing milk. Eggs, freed from the shells are dried at the relatively low temperature of 54·5° C. (130 F.). The operation can be rapidly executed in containers kept at this temperature, from which the air has been exhausted, and from which likewise the aqueous vapour is withdrawn as fast as it is given off by evaporation from the eggs.
>
> The advantage of this method consists in the fact that there is no alteration in the chemical composition of the eggs. There is simply a loss of the greater part of the water held mechanically in combination, as when fruit is dried by free exposure to the air and sun, or by more rapid artificial methods. When thoroughly desiccated and brought by pulverization into the state of coarse powder, the egg material can be preserved for an indefinite period in ordinary packages, if kept in a dry place.
>
> The eggs are 'reconstituted' by the simple addition of water to the dry powder, the resultant mass being quite indistinguishable from newly beaten-up eggs. Before the method was accepted as a basis for industrial exploitation, it was submitted to exhaustive critical tests by the Victorian Department of Agriculture, which demonstrated that purity, ease of digestion, flavour, etc., were entirely unaffected by the operations of desiccation, preservation for a long period, and reconstitution by the addition of water, provided that fresh eggs were employed at the outset.
>
> From the economic standpoint it is evident that the cost of eggs as an article of food will be notably reduced when large tracts in remote regions are utilized for the purpose of poultry raising. An important factor would be the low cost of freight for a compact powdered material as contrasted with the expense of transporting eggs in the natural fragile condition, containing 74 per cent. of water, and involving much waste space in packing. The simplicity of preservation and the ease with which a variety of savoury dishes can be expeditiously prepared from eggs enhance the value of such a food preparation, not only for the ordinary household, but also for the emergencies of travel.

RUBBER EXPERIMENTS IN BRITISH GUIANA.

Experiments in rubber cultivation are in progress at the Onderneeming School Farm, British Guiana. The varieties under trial are Para rubber (*Hevea brasiliensis*), as well as *Castilloa elastica, Funtumia elastica*, and the indigenous rubber, *Sapium Jenmanii.*

With regard to the Para variety, the latest report on the experiments states that plants set out in June 1902, had, at the end of September last, grown to a height of 43 feet, with a circumference of 17 inches; trees planted in November 1903 had (also in September last) reached a height of 24 feet, with a circumference of 12 inches, while Para rubber trees, planted in December 1904, had attained a height of 20 feet and a circumference of 7 inches by September 1907.

All these trees, it was stated, had been topped from time to time, as the natural tendency of the trees is to grow to an unlimited height without branching, and with a very small girth.

Young plants of all the above-mentioned species have been planted out under various conditions—some in swamp land, some in sand, etc., with a view to ascertaining under what conditions they grow best.

The Castilloa trees are reported as having grown fitfully, and different trees show considerable differences in rate of development. One tree of this variety, four and a half years old, is now seeding; it is 12 feet high, and has a girth of 10½ inches at 1 foot from the ground.

The Funtumia or West African rubber trees are hardy, and have shown excellent growth. It is mentioned, however, that they have a strong tendency to branch excessively, and grow into bushes rather than trees unless the lateral branches are regularly cut back. The oldest Funtumia trees at the station are four and a half years ,and their height 21 feet with a girth of 12 inches. The trees have given a good supply of seeds, and a large number of plants have been raised. Of these, 3,466 have been sold and sent to estates in Essequebo and Berbice, and 500 to the North West district.

RUBBER PLANTING IN HAWAII.

The question of the maintenance of a satisfactory forest reserve has of late years been receiving considerable attention in Hawaii, in common with many other countries. The *Hawaiian Sugar Planters' Monthly* for November last contained the Annual Report of the Forest Committee of the territory: this gives a good deal of information and advice as to the most suitable and remunerative varieties of hardwood timber. From the closing section of the report, the accompanying notes, dealing with rubber planting in Hawaii, are taken:—

Systematic rubber planting in Hawaii as an industry was begun three years ago, but until this year there have been no systematic tapping of trees and keeping of statistics of yield, on which to base commercial calculations of the profitableness or otherwise of the business.

During the past year under the direction of Mr. Jared Smith, chief of the Federal Agricultural Experiment Station in Hawaii, a number of mature rubber trees growing in the territory have been tapped and statistics kept of the yield. The results are not yet available for publication, but sufficient has been learned to make certain that rubber production will be profitable in this territory under existing conditions.

This fact has been accepted to the extent that there are already five incorporated companies planting rubber on a considerable scale, besides a large number of individuals planting on a small scale. There have already been planted in the territory between 500,000 and 600,000 rubber trees. The first tapping on any scale will take place next summer

From the standpoint of a profitable industry there is great hope in rubber, especially as, although the trees require good soil, they can be grown to advantage in patches scattered through the many small valleys which are found in all the mountain sections of the territory. The business will therefore not only be of value in creating a new and profitable industry, but will incidentally assist in reafforesting the islands, especially where, by reason of inaccessibility or smallness of area, it probably would never pay to plant for lumbering purposes.

There are unquestionably, however, large areas which are unfit for general cultivation, which should be reafforested, and where rubber trees will do as well, and be more profitable, than any other tree which can be planted there.

The Territorial Agricultural Forestry Department has also interested itself in the matter: is furnishing rubber seed at approximate cost to all who desire it, and is prepared to give expert advice and suggestions as to locations and methods of planting.

There is no reason why, incidentally, a number of sugar plantations, especially those in the non-irrigated windward districts, should not, at slight expense, plant large numbers of rubber trees in gullies and other localities unsuitable for cane, resulting in a benefit by present afforestation, and ultimate profit from the rubber product, which, if present prices prevail and the expectations of those who have made a study of rubber are fulfilled, will eventually be greater per acre than is even sugar.

The concrete results of next year's tapping of the trees at Nahiku will be watched with eager interest by all interested in the development of Hawaii.

CASTILLOA RUBBER.

Referring to the cultivation of Castilloa rubber as carried out in Mexico, the report, for 1906-7, of the Chief of the Bureau of Plant Industry, U. S. Department of Agriculture, contains the following notes:—

Visits to extensive Castilloa rubber plantations in Mexico give evidence of the need of caution in enterprises based on the Central American rubber tree, for it is being found that the bark in the proximity of old cuts yields very little latex. The rubber-forming materials of the latex are restored only slowly, if at all. The first cuts yield far more latex than in the Para rubber tree, but there is no such persistent production, nor any repeated flow to be obtained by paring back the edges of the wounds, which, in the case of the Para rubber tree, produce more latex than previously uninjured bark.

The latex of Castilloa is also quite different from that of the Para rubber tree, and requires different methods of treatment. With slow coagulation the quality of the product deteriorates. Exposure of the latex to air and sunlight by spreading it out in thin layers produces better and more durable rubber than bulk coagulation, even with the thorough and repeated washings which are now generally advised.

The backward condition of some thinly planted areas of Castilloa rubber trees indicated the damaging effects to the crop of exposing the soil to sun and rain. Rapid growth of the trees is promoted by a surface mulch with decaying organic matter.

MARKET REPORTS.

London,—March 17, 1908, 'The West India Committee Circular: Messrs. Kearton, Piper & Co., March 17, 1908; Messrs. E. A. de Pass & Co., February 21, 1908.

Arrowroot—2½*d.* to 3¾*d.*
Balata—Sheet, 2/3 to 2/4; block, 1/7½ to 1/8 per tb.
Bees'-wax—Good quality £7 15*s.*
Cacao—Trinidad, 80/- to 90/- per cwt.; Grenada, 75/- to 82/- per cwt.
Coffee—Santos, 30/- per cwt.; Jamaica, 40*s.* 6*d.* to 60*s.*
Copra—West Indian, £16 10*s.* per ton.
Cotton—St. Vincent, 18*d.* to 20*d.*; Barbados, 18¼*d.* to 19*d.*; St. Kitt's, 18½*d.* to 20*d.*; Montserrat, 18*d.* to 19½*d.*
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—4/6 to 5/ per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—14/6 to 20/- per box.
  Oranges—Jamaica, 5/ to 6/- per box.
Fustic—£3 10*s.* to £4 per ton.
Honey—20*s.* to 27*s.* 6*d.* per cwt.
Isinglass—West India lump, 1/6 to 2/- per lb.; cake, no quotations.
Lime Juice—Raw, 1/2 to 1/5 per gallon; concentrated, £12 12*s.* per cask of 108 gallons; Distilled Oil, 1/11 per tb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 5*s.* to £4 5*s.* per ten; Roots, £2 10*s.* to £3 10*s.* per ton.
Mace—Quiet, no quotations.
Nutmegs—68's to 69's, 7*d.* to 9*d.*; 75's, 6*d.* to 6½*d.*; 105's, 4¼*d.*; 111's to 115's, 3¾*d.* to 4¼*d.*; 121's, 3½*d.*; 138's, 3¼*d.*
Pimento—2½*d.* per tb.
Rum—Jamaica, 2/11 to 3/3; Demerara, 1/2½ to 1/4; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, 14*s.* 10*d.*; Molasses, 14/- to 14/6.

New York,—March 6, 1908.—Messrs. Gillespie Bros. & Co.

Cacao—Caracas, 15c.; Grenada, 15c. to 15¾c.; Trinidad, 16¼c. to 16½c.; Jamaica, 13¼c. to 14½c. per tb.
Cocoa-nuts—Jamaica, select, $26·00 to $28·00; culls, $17·00; Trinidad, $26·00 to $27·00; culls, $16·00 per M.
Coffee—Jamaica, good washed, 8½c. to 11c.; good ordinary, 6⅞c. to 8¼c. per tb.
Ginger—10½c. to 12½c. per tb.
Goat Skins—Jamaica, 55c.; St. Thomas, St. Croix, St. Kitt's, 53c. to 55c., dry flint; 27c. to 40c., dry salted.
Grape Fruit—Jamaicas, $1·75 to $3·00 per barrel.
Limes—Dominica, $3·75 to $4·50 per barrel.
Mace—28c. to 33c. per lb.
Nutmegs—110's, 9¾c. per tb.
Oranges—Jamaica, $2·50 to $3·25 per barrel.
Pimento—5c. per tb.
Sugar—Centrifugals, 96°, 3·89c. to 3·92c.; Muscovados, 89°, 3·42c.; Molasses, 89°, 3c. per tb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., March 24, 1908; Messrs. T. S. Garraway & Co., March 30, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 tb.
Cacao—Dominica, $15·00 to $16·00 per 100 tb.
Cocoa-nuts—$12·25 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 tb.
Hay—$1·55 to $2·00 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—12c.; Fancy, 15c. per gallon.
Onions—Madeira, $2·40 per 100 tb.
Potatos, English—$2·40 to $3·00 per 160 tb.
Peas—Split, $6·20 to $6·50; Canada, $3·30 to $3·35 per bag.
Rice—Demerara, $5·60 to $5·65 (180 tb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89°, $1·90 per 100 tb., package included; Dark crystals, $2·40 to $2·50; Centrifugals, $2·00 to $2·50 per 100 lb.

British Guiana,—March 21, 1908.—Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balāta—Venezuela block, 32c.; Demerara sheet, 48c. per tb.
Cacao—Native, 17c. to 18c. per tb.
Cassava—No stock.
Cassava Starch—No quotations.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 13c.; Jamaica, 12c. per tb.
Dhal—$5·00 to $5·25 per bag of 168 tb.
Eddos—72c. to $1·44 per barrel.
Molasses—Yellow, 19c.; Dark, no quotations
Onions—Madeira, 4c.; Lisbon, 3½c to 4c. per tb.; Dutch, 3c.
Plantains—20c. to 64c. per bunch.
Potatos,—English, $2·40 per barrel.
Potatos, Sweet—Barbados, $1·08 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $5·00 for good; Seeta, $6·00 per bag.
Split Peas—$6·20 to $6·25 per bag (210 lb.); Lisbon, $4·50.
Tannias—$3·60 per bag.
Yams—White, $2.16 to $2·40; Buck, $3·24 per bag.
Sugar—Dark crystals, $2·30 to $2·35; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 tb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
——Cordwood—$2·40 to $2·64 per ton.

Trinidad,—March 21, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$17·00 to $20·00 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—72c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·60 to $2·80 per 100 lb.
Dhal—$5·00 to $5·25 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 tb. (retail).
Potatos, English—$1·15 to $1·25 per 100 tb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—$5·00 to $5·05 per 100 lb.

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Rubber Planting in the West Indies.

RUBBER planting on an experimental scale, was begun in suitable localities in the West Indies several years ago, and a remunerative, if at present somewhat small, industry is gradually being developed in more than one colony, notably in Trinidad and Tobago. The Central American rubber (*Castilloa elastica*) is the kind which has received most attention, since it is apparent that it is well suited to the natural conditions prevailing in this part of the world, and moreover, is well adapted to serve as a shade tree in and around cacao plantations. Para rubber (*Hevea brasiliensis*) is also being planted, and is almost everywhere regarded with favour. For practical purposes, it may be said that planters in the West Indian Islands are limiting their attention to these two varieties. In British Guiana, probably more than one species of *Sapium* are found, which have been proved to yield a good supply of valuable rubber. In that colony, therefore, while experiments are undertaken with *Castilloa and Hevea*, it is possible that the best returns may be obtained from the cultivation of the native rubbers in preference to other kinds.

Considering the great and continually increasing number of uses to which rubber is applied in every-day life, it is manifest that the market for the raw product is in no danger of falling off to an appreciable extent. The rapid displacement of horse traffic by motor vehicles, that has taken place of late years, has alone brought about an enormous and permanent increase in the demand for rubber, while its peculiar physical properties are continually creating fresh uses for it in the arts and industries.

The world's supply of wild rubber, the chief sources of which are the Amazonas district of Brazil, Mexico and other parts of Central America, and Africa, is being exploited as rapidly as collectors can get it on the market, and since the natural rate of replenishment is far less rapid than the present rate of collection, it is obvious that exhaustion of the wild supply must sooner or later come about.

It was lately pointed out in one of the leading rubber journals that the danger of an appreciable fall, under ordinary circumstances, in the price of rubber was improbable, since, assuming such a drop to take place temporarily, the product would at once be available for a large number of uses for which the present price is prohibitory, and for which more or less inefficient substitutes have now to be found. Such an enhanced demand would, of course, tend again to put up the price, until a natural equilibrium was once more established.

Another point to which attention may be drawn in considering the prospects of plantation rubber is the fact that while the demand is universal, the area of production is a comparatively limited one, since all the commercial rubber-yielding plants flourish only within the tropics. In this respect rubber differs from sugar. The demand for the latter article is universal also, but production is carried on in temperate as well as in tropical regions, and the supply is limited only by considerations of profit. Even within the tropics, it is only in suitable districts that rubber cultivation can be carried on, and it would appear that in the future, dealers will have to look chiefly to the Malay States, Ceylon, Northern and Western Brazil, Central America, a portion of the West Coast of Africa, and it may be hoped, the West Indies, for the supply of plantation rubber which will be needed to replace the annual output now obtained from wild sources.

It is evident from the above considerations that estate owners and others who may be debating the prospects of rubber culture, need have no fear as to the ultimately profitable nature of the industry, provided of course, due judgement is exercised in the selection of the variety grown, in planting only on suitable soils, and in the actual planting operations and after-management.

As regards the present status of the rubber industry in the West Indies, Trinidad and Tobago are the islands in which the greatest advance has been made. More than a year ago there were thirty-three estates engaged in rubber production in Trinidad, and shipments were taking place in fairly large quantities. Prices varying from 4*s*. 3*d*. to 5*s*. 3*d*. were reported for Castilloa sheet rubber. The Castilloa tree appears to do very well in Trinidad, the conditions of soil and climate being congenial. About ten estates are also planting Para rubber as well. In Jamaica, too, many planters are now seriously taking up rubber cultivation, Para and Castilloa being the kinds receiving chief attention.

The rubber industry is likely to become prominent in British Guiana in the near future. The colony possesses large tracts of land well suited to the requirements of Para and Castilloa, while it is fortunate in possessing quick-growing native species of *Sapium*, which are reported to be very hardy, and to give good returns of rubber two or three years earlier than Castilloa, and three or four years earlier than Para trees. Different varieties of rubber are being experimentally grown at the Onderneeming Farm School, and have been under observation for some years. The Combined Court of British Guiana has voted the funds for the upkeep of a rubber Experiment Station in the North-West district. It is stated that many applications for land for rubber-planting purposes have been received since the conditions under which such land may be leased have been settled.

In St. Lucia, there are some few hundred Castilloa trees, chiefly planted through cacao estates, and from nine to twelve years old. Tappings of some of the older trees have been undertaken with satisfactory results, and about two years ago samples of St. Lucia rubber were valued at 5*s*. per lb. in London.

Castilloa is also regarded as the best rubber tree for cultivation in Dominica. The trees grow well and can be expected to yield good rubber in eight to ten years from the time of planting. The fact that sheet rubber from Dominica was valued at 5*s*. 7*d*. to 5*s*. 9*d*. per lb. in London in 1906 indicates that no doubt need be entertained as to whether a product of high quality can be produced in the island. Samples of Para rubber, the first produced in Dominica, were forwarded to London in 1907, together with further specimens of Castilloa. Both were favourably reported upon, but the Para samples were adjudged the best.

In discussing this question of the development of the rubber industry, reference may again be made to the International Rubber Exhibition, which is to be held in London in September next, and of which full particulars were given in a recent issue of the *Agricultural News* (Vol. VII, p. 94). It is satisfactory to note that, as regards the West Indies, the Permanent Exhibition Committees of Trinidad and Dominica have already made arrangements to send samples of rubber, etc., to this Exhibition. In addition to rubber samples, portions of rubber trees showing the method of tapping, together with specimens of leaves and fruit, and photographs might be sent, as well as decorative material so as to make the West Indian section thoroughly attractive.

SUGAR INDUSTRY.

Sugar Industry in Java.

A sugar expert from the Dutch East Indies lately visiting Dutch and British Guianas, gave the *Demerara Daily Chronicle* some interesting particulars in regard to the sugar industry of Java.

The great advantage possessed by Java as compared with British Guiana lies in the fact that the Dutch colony possesses a plentiful and cheap labour supply. A labourer's daily wage in Java was stated to be 6c. The planter is therefore able to give his land all the cultivation needed, and gets a high return of sugar per acre. This return was mentioned as averaging 4 tons, compared with 1·75 tons per acre obtained in British Guiana.

Of late years there has been considerable amalgamation of small estates in Java, and central factories with up-to-date machinery have been largely established. The greater extracting power of this machinery would help to account for the increased return of sugar as compared with estates employing the muscovado process. The average cost of manufacturing sugar in Java is about £6 16*s.* per ton.

The sugar lands of the Dutch colony are naturally well-drained, and no extensive irrigation schemes have been necessary to ensure a reliable water supply. On the clay lands hand labour only is employed, but ploughs are utilized on the lighter soils.

Ratooning canes is not practised on any estate in Java. No doubt the successful results of the campaign against the root disease of the sugar-cane in the island are largely due to this fact. This colony, it may be mentioned, was the place from which the disease was first reported, in 1895, but at present it is stated to be difficult to find a specimen of the fungus *Marasmius sacchari* in the island. Every crop of sugar-cane is entirely replanted with fresh cuttings.

Another feature of cane cultivation in Java is that the crop is not cultivated continuously on the same land without intermission. Two crops of rice are grown on the land after the removal of the sugar crop, before it is again planted with canes.

The sugar growers and owners of factories, it appears, seldom own the land, but rent it from the native proprietors at about 36*s.* per acre per annum. There is no cane-farming industry, the planters growing all the canes worked up by them at the factory.

The aid of the chemist and botanist has been largely called in to the assistance of the Java sugar industry, and an extensive series of seedling and manurial experiments is in progress at the three Experiment Stations of the island. The cost of these stations, it was mentioned, is entirely borne by the planters themselves, no assistance being given by the Government. Recognizing the influence of local conditions, and the fact that results obtained on one estate may be considerably modified on another in the same neighbourhood, owners of some of the larger estates have begun to carry out experiments of their own.

The cultivation of seedling canes in Java has progressed so far that at present about 50 per cent. of the total area under sugar cultivation is planted with these new varieties.

Formerly the United States took the great bulk of the sugar produced in Java, but the exports to New York have latterly decreased, and now no more than one-third of the output (1,011,546 tons in 1906-7) goes to America. A still further decrease in the shipments is expected. The chief markets now open to the Java sugar producer are those of Japan and British India. Japan purchases a large amount of raw sugar for refining purposes, while British India requires a pure white sugar which needs no refining. The prospects of Java on the latter market are good. Some 315,000 tons of raw sugar were also in 1905-6 exported to Hong Kong, where there exists a very large sugar-refining industry.

Beet Sugar Industry of the United States.

The particulars relating to the production of beet sugar in the United States which were given in the *Louisiana Planter* (February 21, 1908) would indicate that if the present rate of development of this industry is continued, the United States will in a comparatively short number of years, be entirely independent of all outside countries for its sugar supply. Referring to this development, the *Planter* expresses the opinion that in no other branch of agriculture has the encouragement and assistance of the United States Department of Agriculture been attended with more strikingly beneficial results than in connexion with the beet sugar industry.

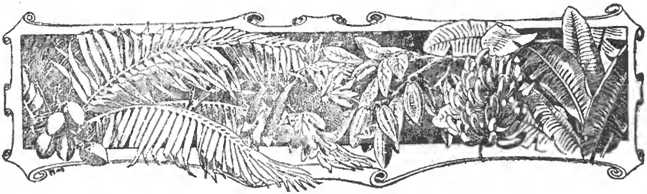
The prospect thus indicated to the West Indian sugar-producing colonies of a continuously declining market for their product in the States should be an additional incentive to them seriously to consider the question of closer commercial intercourse with the Dominion of Canada, the chief country in which the West Indies and British Guiana are likely to find customers for their cane products in the future.

The average annual production of beet sugar in the United States up to 1887 was no more than 560 short tons (of 2,000 ℔.). In 1891, the production had advanced to 6,000 tons. In the following year, this quantity had more than doubled, the output reaching 13,450 tons. The production of beet sugar in 1893 was 22,344 tons, while by 1897, it had reached 45,246 tons. Two years after this date, the crop produced was 81,729 tons, while by 1901, the annual output had again more than doubled, amounting to 184,606 tons. In 1903, the year's crop was 240,604 tons; in 1906, it was 483,000 tons, while in 1907, the output of beet sugar totalled 500,000 short tons.

The total amount of sugar imported into the United States in 1906 amounted to 1,989,665 short tons, so that it will be seen that the present home production of beet sugar now reaches rather more than one quarter of the total sugar imports.

The tendency of the United States market as regards sugar from the West Indies and British Guiana may be judged from a glance at the shipments of recent years. In 1898 the quantity of sugar exported from these colonies to the States was 185,274 tons (of 2,000 ℔. each). Five years later America received from the West Indies and British Guiana, sugar to the quantity of 182,142 tons. In the following year (1904), however, the same colonies were unable to find a market in the States for more than 69,572 tons. A slightly less quantity, 68,284 tons, was shipped in 1905, while in 1906 the shipments fell to 44,148 tons.

In the face of the above figures, it is encouraging for sugar producers in these colonies to note that whereas the total exports of sugar to Canada from the West Indies and British Guiana were, in 1900, no more than 6,496 short tons, they had advanced to 125,776 tons in 1905.



WEST INDIAN FRUIT

COCOA-NUT CULTIVATION.

The Brazilian journal *El Hacienda* recently contained a lengthy article dealing with the cultivation, manuring, etc., of cocoa-nut plantations. Some of the points dealt with are worthy of reproduction.

In the nursery where the seedlings are grown, it is recommended that the nuts be planted, base uppermost, in raised banks of earth, the nuts being placed quite close to each other. Germination takes place in about four or five months, and transplanting may be carried out when the plants have three or four leaves. The young trees are set out at distances of from 23 to 28 feet each way. The more fertile the soil, the greater the distance at which they may be set, since growth is more rapid.

The holes dug to receive the cocoa-nut plants should be about 3 feet in diameter, and it is advantageous to half fill the hole with manure, or earth mixed with ashes. Growth is more rapid in a fairly loose soil. In dry seasons or dry districts it will be necessary to water the young plants regularly, and indeed the tree is one that always repays attention to provide a good supply of water. Depth of soil is very favourable to good growth of the cocoa-nut.

For the first two or three years after planting, the cultivator may with advantage raise other crops, such as maize, cassava, ground nuts, etc., between the rows of palms. If the last-named crop is grown and ploughed in, there will be a considerable gain to the fertility of the soil. Regular cultivation of the land during the early years of growth of the cocoa-nut trees must be undertaken in order to bring about development of the plantation at the earliest date. Experienced growers assert that the cost of such operations is fully repaid by the enhanced returns obtained.

Some yield of fruit may be given on good soil, where the trees have received every attention, at the end of five years after planting, but a full crop will not be obtained until from the seventh to the tenth year.

At the end of the fifth year it is recommended that the whole of the plantation be cleared of other crops, undergrowth, etc., and the land receive a fairly deep ploughing. The soil should not be disturbed, however, too near the roots of the palms.

As a general rule, the application of fertilizers to the cocoa-nut crop is repaid by an increased yield, but manures should not be given until the trees have commenced to bear. In fact, unless the soil is poor, manuring may be deferred until one or two crops have been obtained.

Pen manure, and the use of green manure, such as ground nuts (already mentioned), cow peas, and velvet beans, are reported to form excellent dressings for cocoa-nut plantations. On some estates in Ceylon it is stated to be the custom to tether cattle to the trunks of the trees, allowing them in this way to manure the plantation with their droppings. In order to obtain the best results the manure should be afterwards worked into the soil by cultivation.

A dressing of manure may occasionally be given with advantage, even though the plantation shows no sign of falling off in condition. The ground should be ploughed and the manure worked into the soil. As in the case of most other fruit trees, it is usually preferable to dress cocoa-nut palms with slow-acting manures, such as bone meal, basic slag, organic refuse, cotton seed meal, etc., instead of using quick-acting manures, such as nitrate of soda and superphosphate. In the former case, the results are not at once apparent, but they are continuous, and spread over a considerable time. Nitrogen and phosphoric acid are stated to be the elements chiefly necessary, but, except on very heavy soils, an occasional dressing of a potassic manure should certainly also be given, since large quantities of potassium salts are removed from the soil by a crop of cocoa-nuts.

When the husks are removed from the nuts on the plantation, these should always be buried between the rows of palms, since a considerable amount of fertilizing matter is returned to the soil in this way.

An average return of nuts is usually considered to be about 3,000 per acre, and assuming sixty trees to this area, each tree would give about fifty nuts. With judicious cultivation and manuring, however, this return, it is stated, is not infrequently increased to seventy or eighty nuts per tree, which means a total of from 4,200 to 4,800 nuts per acre.

CITRON PEEL REQUIRED.

A letter has been received by the Imperial Commissioner of Agriculture from a firm of produce dealers in London, in which this company states that it would be glad to receive samples of citron peel, cured ready for the use of confectioners. Growers who propose to send samples should communicate in the first instance with the Imperial Department of Agriculture, stating the price (per lb. or otherwise) delivered in London. They should also mention the probable quantity that could be shipped if required, and also the season of the year when this product is available. The market for citron peel is at present not a large one, but it is probable that the demand might become more extensive if it is known that a good supply can be relied upon.

GROUND NUT EXPERIMENTS IN DOMINICA.

Experiments with three varieties of ground nuts ('Dixie Giant', 'Tennessee Red', and 'Africans') were commenced at the Dominica Agricultural School about a year ago. Seed of the two first-named varieties was obtained from the United States by the Imperial Commissioner, since these two kinds were reported to be of special excellence.

All three varieties appear to have done well in the experiments so far carried out, and the nuts were unattacked by any pest. The soil on which the trials were carried out was of a very light and sandy nature.

The nuts produced sold very readily on the local market, but it appears that smaller nuts are preferred to those of larger size.

Mr. A. J. Brooks, Officer-in-charge of the Agricultural School (who has prepared and forwarded to the Imperial Commissioner of Agriculture, the report dealing with the experiments given below), states his belief that ground nuts should form a remunerative crop in Dominica. It is hoped to carry out further and more conclusive trials with the several varieties of nuts during the coming season. The following is Mr. Brooks' report:—

'DIXIE GIANT' VARIETY.

Two and a half pounds of seed nuts were received from the Head Office in May. These were sown on September 4, in rows 1½ feet apart both ways.

The plants grew well and commenced to flower on October 3, twenty-nine days after sowing.

Three weedings were given. The plants ripened off and the nuts were reaped on January 15, 6¼ lb. of cured nuts being obtained. The area being so small it was scarcely possible to estimate the yield per acre. The object chiefly sought in this trial was to see if this variety would thrive in Dominica and to raise as much seed as possible so that a plot sufficiently large could be sown the next season to estimate the return per acre, etc.

The results of this first trial were therefore very satisfactory, the nuts obtained being of a good quality and the yield also good. The crop took a little over four months to mature.

'TENNESSEE RED' VARIETY.

Only 3 oz. of seed was received, this being too small a quantity to estimate the yield per acre. The object sought was the same as with the former variety.

Sowing took place on August 6, the distance of planting being 2 feet each way.

Being so few, special care was taken of the plants of this variety, the plot being irrigated when necessary and the branches carefully pegged down to assist the formation of nuts. The plants thrived well, making good vines and producing numerous flowers.

Reaping took place on December 28, and the yield was extremely good, 1 lb. 3 oz. of cured nuts being obtained.

'AFRICAN' VARIETY.

Twenty pounds of seed nuts of the 'African' variety were obtained from Barbados early in the year.

Sowing took place in May, two seeds being sown in each hole, 1 inch deep and 1 foot apart in the rows, and 1½ feet apart between the rows. The area planted was ⅛ acre in extent.

The plants grew well and soon covered the ground; they commenced to flower thirteen days after sowing. This was rather premature and caused no doubt by the excessive drought experienced at the time.

The plot was mulched with a light covering of small leaves such as bamboo, which readily fell between the plants, thus protecting the roots. Irrigation was necessary every alternate day for three weeks. Three weedings were given.

Reaping took place on November 4, the crop having taken six months to mature.

Four hundred and forty-three pounds of cured nuts were obtained from this plot, this being at the rate of 3,569 lb. per acre. This was an exceptionally good yield and the nuts sold readily at 4*d.* per lb. in the local market.

SCHOOL GARDENS IN THE WEST INDIES.

The accompanying extracts from the report presented by the Education Section at the late Agricultural Conference, dealing with school gardens in the West Indies, their provision and educational value, are reprinted as forming a supplement to the editorial article on the subject that appeared in the last issue of the *Agricultural News*:—

The provision and use of school gardens have been general, and, on the whole, the progress has been fairly satisfactory. Where the progress has been less satisfactory, it has been in part due to the difficulty of obtaining land, as in Barbados, or to the cost of preparing it, as in British Guiana; but more to the smallness of the grant allowed to elementary teachers for agriculture.

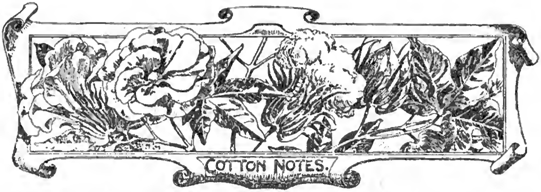
There is no indication that teachers are now unwilling to teach the subject in any of the colonies. But in some, as in Barbados, it pays them better to teach other subjects. Where real success has been attained, as in Trinidad, it has been due to the liberal scale on which grants have been allowed for teaching the subject.

Where it is impossible to obtain land for school gardens, the children in many schools cultivate plants in pots and boxes at school and at home.

An interesting account has been given of the model gardens which have been established in British Guiana – two in Georgetown and three in the country districts. These appear to be excellent centres for teaching the children and others in their neighbourhood, and we specially commend a practice which there obtains, of giving to four selected boys the opportunity of continuing their agricultural education by apprenticeship to the scientific instructor of the Government.

In the smaller colonies, it is felt that one of the greatest wants is that of suitable direction to teachers and children and the people generally, by means of frequent visits of qualified Agricultural Instructors.

All the representatives on the Committee wish to emphasize the vast importance of this subject of education in agriculture to the welfare of every colony, and all bear testimony to the marked advance, not only in the knowledge of, but in general interest in, agricultural matters. This is true not only of children, but of parents and others generally. The opposition of parents, the indifference of teachers, and the ignorant attitude assumed by some that scientific instruction was not needed have passed away, and considering the difficulties such as these, combined with the smallness of the financial grants, the Committee consider the past satisfactory and the future full of hope.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date March 20, with reference to the sales of West Indian Sea Island cotton:—

The fine spinning trade continues extremely depressed, and buyers in consequence are only prepared to buy small parcels for immediate requirements.

As the West Indian Sea Island cotton supply is in competition with a stock of 3,000 bales American Sea Islands lying at Charleston, spinners will only buy at a marked concession in values.

Holders of West Indian cotton are anxious for sales at full prices, but under present conditions, it is only with difficulty that fair market prices can be obtained.

The sales amount to about 230 bales, including St. Kitt's at 16*d.* to 17½*d.*; St. Croix at 17½*d.*; Nevis, chiefly at 16*d.*, with a few at 17*d.*; Montserrat and Anguilla at 16*d.* to 16½.; and a few bales of St. Vincent at 19*d.*

SEA ISLAND COTTON IN THE BAHAMAS.

Experiments in the cultivation of Sea Island cotton, which seem to promise well, were carried out in Long Island and Exuma, two of the Out Islands of the Bahamas, during 1907. Reports on the work done, and the results obtained, appear in the *Bulletin of the Agricultural Department* of the Bahamas for January last. The experiments were carried out under the direct supervision of the Resident Justices of the two islands, who are also in each case the chairmen of the local Boards of Agriculture.

Five acres of land were planted with cotton in Long Island. The seed was sown, on soil well representing the average of the island, at the end of June and beginning of July. The plants did well, although on the more hilly portion of the area, growth was retarded for want of rain. Fears were entertained that the cotton stainer would prove a serious pest, but the few insects that did appear were kept well under. A first picking of cotton was obtained in October, and after the rains experienced during that month, the plants blossomed afresh, and good prospects of a second picking were reported.

The total cost of clearing and preparing the bush land, weeding and destroying insects over the 5 acres, amounted to £16 2*s.*, while the value of the return (estimated in the report to be at least 800 lb. of lint) is placed at £66 13*s.* 4*d.*

A slightly larger area (5½ acres) was planted with cotton in Exuma, another of the Out Islands, the seed being sown about the middle of June. Drought was experienced in August, but the plants grew fairly well. Several showers of rain did a great deal of good in September. A small gathering of cotton was made in October, but the chief picking took place at the end of November, when 400 lb. of seed-cotton were gathered. At the time of writing the report (January 7) the second picking had not been made, but an excellent return was anticipated. The total cost of cultivation, etc., amounted to £12 10*s.*, the heaviest item being the expense of picking, which was about 5*s.* per 100 lb. of seed cotton.

These results certainly indicate that Sea Island cotton can be profitably grown in the Bahamas.

SEA ISLAND COTTON MARKET.

In their report, dated March 14 last, on the state of the Sea Island cotton market, Messrs. Henry W. Frost & Co., Charleston, write:—

The sales of the week include the 200 bales of tinged cotton referred to in our last circular, and 100 bales of fine quality, at 30c. per lb., sold this week. The market is quiet, with some demand, but at prices much below the present views of factors.

On March 14, Messrs. Frost write:—

The sales of this week consist of 35 bales tinged Sea Islands at 27c., and later, further sales have been made of 50 bales fine quality on private terms. The buying has been on account of the Northern mills. The factors continue to hold the planters' crop lots at 35c. to 40c. and upwards, and also odd bags classing 'fully fine,' at 35c., but there is no demand at these prices. Spinners could, however, probably purchase at a concession. The following are the present prices: Fully fine to extra fine, 35c. to 40c.; fine, 30c.; fully fine, but tinged, 27c.; fully fine to fine stains, 20c. to 24c.

SEA ISLAND COTTON IN THE SOCIETY ISLANDS.

Sea Island cotton at one time formed a very valuable item of export from the French colony of the Society Islands. Up to about twenty-five years ago the annual shipments of lint reached over 1,000,000 lb. per annum. About 1885 the industry began to fall off, but latterly it has again revived. In 1905, 18,375 lb. of baled cotton were shipped to England from these islands, and the exports increased to 52,800 lb. in 1906. The Government is anxious to encourage the industry, and has caused the publication in the official journal of the colony of a series of long articles dealing with the cultivation. A bank closely connected with the colonial Government has also guaranteed a minimum price of 7c. per lb. for all seed-cotton grown in the colony.

CACAO CULTIVATION IN ST. KITT'S-NEVIS.

Some attention has during the past year or two been paid to cacao cultivation in St. Kitt's-Nevis, and the accompanying notes in reference to the subject are taken from the recently issued *Annual Report* on the Botanic Station of the presidency:—

The cultivation of cacao at Molineux estate [St. Kitt's] has been considerably extended during the year and there are now some 22 acres under cultivation. The first planted trees are doing well and give promise of this experiment being a great success. The cultivation is being extended to lower levels, and in one instance one of the cane fields is being planted in cacao. Suitable wind-breaks are being planted to protect the young trees, as without these it would be impossible to grow them in this position.

In Nevis, the cacao cultivation on Madden's estate has developed, and there are some 40 acres in cultivation. Great attention has been paid to this new industry by those in charge of the estate, and the condition of the trees generally does them credit. A small crop will soon be obtained from the first planted trees, which are about five years old. As this estate has abandoned cane cultivation, the addition of a new and remunerative industry must add very much to the value of the estate, and it is also a most useful object-lesson as to the chances of growing cacao in such places in Nevis.

CASTOR OIL PLANT.

Since the castor oil plant (*Ricinus communis*) is very common throughout the West Indies, efforts have occasionally been made in some of the islands, notably in St. Lucia and Jamaica, to encourage its cultivation. In the latter island its cultivation has been urged on account of the fact that the resulting oil was desired for the manufacture of soap. As pointed out in a recent number of the *Agricultural News* (Vol. VI, p. 389), castor oil has of late found such numerous applications in the arts and industries, apart from its use in medicine and as an illuminating and lubricating agent, that the demand for this product is certain to increase.

In order to supplement the information contained in the above-mentioned article, the accompanying particulars in regard to the cultivation of the plant, and the preparation of the oil have been abstracted from an article in a late number of the Cape of Good Hope *Agricultural Journal*:—

The castor oil plant is hardy, and thrives well in most situations. It prefers dry soils, and being an exhaustive crop to the land, demands good preparatory cultivation. The land should be deeply ploughed and subsequently harrowed. This is necessary, as the plant makes an enormous root growth in a short space of time.

The seed is sown in rows which are 5 or 6 feet apart, the seeds being placed about this same distance apart in the rows. They quickly germinate, and in warm climates the plant may grow too rapidly, with the result that a large wood growth is formed, to the detriment of seed production. To avoid this, the main stem of the plant should be pinched back so as to increase the bearing surface.

Harvest season arrives about six months after the seeds have been sown. As previously mentioned, the spikes bearing the capsules are gathered and spread in a shed, being occasionally turned until the capsules have all burst and shed the enclosed beans.

The yield obtained varies between 20 and 30 bushels of seed (900 to 1,350 lb.) per acre, although it is stated that in Texas and Florida a return of as much as 58 bushels to the acre is frequently given. As to the amount of oil obtainable, seed often shows an analysis of 50 to 60 per cent., but the mill yield more frequently ranges only from 33 to 40 per cent. of the weight of the seed. The American standard is 4½ gallons of oil from 112 lb. of seed.

In the process of extraction of the oil, the first step is to remove the hull or seed coat The beans are passed through suitable machinery, which cracks the hulls and these are afterwards removed by winnowing. The operation of removing the husks is one which requires considerable care. The cold-pressure method of expressing the oil is the most costly, on account of the expensive machinery required, but the resulting oil is of the best quality. By this method the beans are crushed to a mash after the removal of the husk. This mash is then placed in small bags, which are piled one above the other with plates of steel between them. The room is kept warm, and on subjecting the pile to pressure, the oil oozes slowly out. After standing for a few days it is filtered through linen into bottles or drums.

In another method, the seeds, after the husk has been removed, are placed in hempen bags, and great pressure is brought to bear upon them by means of screw or hydraulic presses. The expressed oil is then boiled to separate the albumen and mucilage. The impurities are skimmed off, and the oil is siphoned from the vessel and carefully filtered through flannel.

The usual price of castor oil for lubricating purposes is from 2*s*. 9*d*. to 3*s*. per gallon. Thus, taking the figures mentioned above (900 to 1,350 lb.) as representing an average yield, the return from a castor oil crop would be worth from £7 to £10 10*s*. per acre, exclusive of the residual oil-cake, which forms an excellent manure.

These figures are, however, only approximate, and if the oil were extracted by the cold-pressure method described, it would be suitable for medicinal purposes, and would consequently command a higher price.

DEPARTMENT NEWS.

The Imperial Commissioner of Agriculture left Barbados in R.M.S. 'Esk' on April 14, on an official visit to Grenada and St. Vincent and is expected to return in R.M.S. 'Eden' on April 21 next. It is probable that the Imperial Commissioner will proceed on an official visit to the Leeward Islands in S. S. 'Dahome' on April 21, and return in R.M.S. 'Eden' on May 5 next.

Mr. H. A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, returned to Barbados from Antigua by the R.M.S. 'Eden' on April 7.

On the recommendation of the Imperial Commissioner of Agriculture, Mr. Thomas Worm, Deputy Manager of Carrington Plantation at Barbados, has been selected for the post of Agricultural Instructor on the staff of the Local Department of Agriculture in the colony of St. Lucia.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

VOL. VII. SATURDAY, APRIL 18, 1908. No. 156.

NOTES AND COMMENTS.

Contents of Present Issue.

The future prospects of the rubber industry, and the progress so far made in rubber planting in the West Indies are discussed in the editorial.

Some interesting particulars of the sugar industry of Java appear on page 115, followed by an article describing briefly the rapid development of the beet sugar industry of the United States.

A brief article on the subject of cocoa-nut cultivation will be found under 'West Indian Fruit'. Experiments with ground nuts, carried out in Dominica, are described on the following page (117).

The 'Cotton Notes' include market reports, and notes on Sea Island cotton cultivation in the Bahamas and the Society Islands (p. 118).

Information relating to the cultivation of the castor oil plant, preparation of the oil, etc., is contained in a brief article on page 119.

Attention may be drawn to the article on the zapupe fibre plant, that will be found on page 125.

The methods of rice culture adopted in the United States are described on page 127.

Propagation of Sweet Potatos.

In order to demonstrate the advisability of occasionally having recourse to the tuber in the propagation of sweet potatos, and the bad economy of continuing, year after year, to plant vine cuttings from crops which have been themselves grown from vine cuttings, some trials were in 1905, and again in 1906, carried out at one of the Cuban Experiment Stations.

In these tests, sweet potatos of the same variety were grown on adjacent plots which received identical treatment in all respects. In one case, however, the crop was grown from vine cuttings which had been raised in this way continuously for many generations, while in the second case planting was made with slips grown directly from potatos themselves. The plots planted with slips returned a crop three and a half times as great as the plots planted with cuttings. It is evident that the gain of 350 per cent. fully repaid the extra expense and trouble involved.

Sweet Potato Investigations.

Extensive investigations dealing with the sweet potato crop are being undertaken by the United States Department of Agriculture. Experiments are in progress at several centres, and include a study of the kinds most suitable for the several potato-growing districts. Research is being made in regard to methods of growing and their comparative cost, and methods of harvesting, storing, packing and shipping the crop. The question of storage, it is stated, is receiving special attention, in order to determine the best means of curing, the most suitable temperatures to be maintained in the storage house, and the amount of shrinkage that takes place under those conditions. Attention is also being given to the uses and possibilities of sweet potatos as food for stock, as well as to the desiccation and canning of the product for human consumption.

Climate of the West Indies.

The first report of the Canadian Trades Commissioner lately appointed at Barbados (Mr. E. H. S. Flood) has recently been published by the Department of Trade and Commerce of the Dominion. In reference to the climate of the West Indies, Mr. Flood writes: 'One of the causes which have apparently deterred Canadian firms sending their travellers to the West Indies, is the quite erroneous opinion as regards climate. With the exception of the months of August, September, and October, which are rainy and a little warmer than the other months of the year, the heat is not greater nor so oppressive as in New York, and not greater than in parts of Ontario in summer. Some of the islands of the West Indies, particularly Barbados, claim the finest climate in the world, and with much ground for such a claim. The terror of the tropics may be a real terror when thinking about travelling in India, but it ought not to exist as regards the West Indies, where the heat is always tempered, and kept quite bearable by refreshing breezes from the ocean, and health conditions are generally favourable.'

Ylang-ylang Cultivation.

Mention has been made in past numbers of the *Agricultural News* (Vol. III, pp. 151, 231) of the Ylang-ylang tree, the flowers of which give, on distillation, an essential oil, very valuable for perfumery purposes. The tree belongs to the same family as the Sour sop (*Anonaceae*), and appears to flourish in many of the Botanic Gardens of the West Indies, where specimens have been planted.

The tree is largely grown in Réunion for the production of its essential oil, the price of which has steadily increased in value of late years. It is also cultivated in the Philippine Islands.

Recent U.S. *Consular Reports* from Cochin China state that planting of the Ylang-ylang has been taken in hand on several estates in the province of Bienhoa with satisfactory results. The high price obtained for the essence makes the cultivation highly remunerative. It is stated officially that 2 acres planted with 300 trees may give 6,500 lb. of flowers, which would yield at least 33 lb. of essence.

In the past there has apparently been some confusion as to the proper botanic name of the ylang-ylang. It has been referred to as *Artabotrys odoratissimus* and *Unona odorata*. It is evident, however, that the correct name is *Cananga odorata*.

A B C of Lime Culture.

The above is the title of the latest pamphlet (No. 53) in the series issued by the Imperial Department of Agriculture. It has been published in view of the increasing attention that is being given to lime culture in parts of the West Indies, and with the object of disseminating information as to the best methods of cultivation, and the different ways of utilizing the produce. Lime cultivation is annualy extending in Dominica (where it is the chief industry of the island), and in Montserrat, where it is second only to cotton. Progress is being made at St. Lucia, Carriacou, and other portions of the West Indies, and the industry is also being taken up in British Guiana.

The pamphlet should serve as a popular guide in regard to the above points to all taking up lime growing. It is believed that it will be of special value to young settlers and others embarking in the industry, since it gives full advice on the subjects of choice of land, laying out plantations, preparation of seed beds, raising of plants, etc.

The trade in green limes and pickled limes from Dominica and Montserrat is discussed, and the methods employed in the preparation of the various products of fruits, i. e., raw and concentrated lime juice, citrate of lime, hand-pressed lime oil and distilled lime oil, are described.

The insect pest and fungus diseases of lime trees are also dealt with.

The four appendices to the pamphlet give further information on the subjects of citrate of lime manufacture, the cultivation of limes at Montserrat, details of the exports of lime products from Dominica and Montserrat, and a table of useful references to literature dealing with the lime industry.

The manuscript was originally prepared by Mr. Joseph Jones, Curator of the Dominica Botanic Station. It was afterwards carefully revised by the Hon. J. C. Macintyre, an experienced and successful lime planter at Dominica, and by the scientific officers of the Department.

The price of the pamphlet, which is obtainable from all the agents for the sale of the Department's publications, is 4*d*., free by post, 5*d*.

Sugar Production in Cuba.

Since so much is at present being heard of the sugar-producing capacity of Cuba, some details, taken from a tabular statement included in the latest British *Consular Report* on the trade and commerce of Cuba, may not be without interest. The sugar crop of 1906-7, which was a record one, reached 1,427,973 tons. In 1905-6, the output was 1,178,749 tons, and in the year before this 1,163,258 tons of sugar were produced.

It is apparent, however, on comparing the planted sugar acreage with the total area suitable for cane cultivation, that the limit is far from being reached. As much as 15,451,264 acres, or more than half the area of the island, are said to be suitable for cane growing, but only 458,363 acres (or less than one-thirtieth of this area) are planted. In the province of Mantanzas, which has the largest proportion of its available land under sugar, no more than 8·33 per cent. is planted, while in Havana no more than 1·72 per cent. of the land suitable is as yet growing canes, and in Pinar del Rio only 0·73 per cent. From a consideration of these figures, it is at once obvious that enormous possibilities of development lie before the Cuban sugar industry.

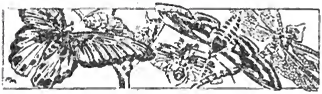
Agricultural Education in Great Britain.

The grants made by the Board of Agriculture of Great Britain in aid of agricultural education amounted to £11,550 in the year ending March 31, 1907, an increase of £1,000 over the previous year. This increase is chiefly accounted for by a grant of £800, given for the first time to the Royal Veterinary college. In all, twenty colleges and schools now share in the funds placed at the Board's disposal by Parliament, and the number of students receiving instruction at these various centres was 1,221 in 1906-7.

These figures are regarded as fairly satisfactory, but in the report lately issued, dealing with this side of the Board's work, it is mentioned that the number of students pursuing the longer courses of agricultural education offered at many of the colleges does not tend to increase to a very great extent.

The special grants offered by the Board in aid of agricultural experiments and research during the year amounted to £495.

In addition to the Government Grant, the County Councils of England and Wales expended a sum of approximately £80,000 for agricultural education purposes during 1906-7.



INSECT NOTES.

The Argentine Ant.

At the twentieth annual meeting of the American Association of Economic Entomologists, held at Chicago, Illinois, on December 27 and 28, 1907, Mr. Wilmon Newell presented a paper entitled 'Notes on the habits of the Argentine or "New Orleans" ant (*Iridomyrmex humulis*, Mayr.).'

Mr. Newell in his paper, which appears in the *Journal of Economic Entomology*, Vol. 1, No. 1, expresses the opinion that the entomological problem presented by the occurrence of this ant in the Southern United States is one which will rank in magnitude alongside the problems presented by the San José scale, gypsy moth, and cotton boll weevil, but in marked contrast to these it is not likely to admit of remedial measures being as easily applied.

The Argentine ant was first described from material collected near Buenos Ayres in 1866. It does not appear to have been mentioned in the literature of economic entomology until 1904, when Mr. E. S. G. Titus, of the Bureau of Entomology, U.S. Department of Agriculture, visited New Orleans and made observations on this insect, which were published in *Bulletin 52* of the Bureau of Entomology of the Department of Agriculture.

The date and manner of introduction of the Argentine ant into the States are largely conjectured, but there seems to be no doubt that New Orleans was the place of the first introduction, and that coffee slips from Brazil were the means by which this was brought about. The pest was known to occur in New Orleans in 1891, and it is probable that it was introduced sometime prior to that date.

At the present time the infested district extends from New Orleans, to a distance of about 200 miles, along the principal railroad lines.

The Argentine ant has thus far attracted most attention as a household pest. Its colonies are to be found under houses, beneath outhouses, in compost heaps, in hollow trees, and beneath the walls of dwellings. Among the substances upon which this insect feeds are mentioned sugars and syrups of all kinds, fresh meat, blood, lard, cream, fruit juices, honey, cakes, and dead insects.

The ants are able to make their way over the surface of water for a short distance, so that the precaution sometimes adopted, of standing the legs of tables in bowls of water has not proved a protection against them, and when kerosene has been added to the water, it has been found that the bodies of the ants which were killed by the oil, served in a short time as a bridge by which the others were able to pass over to the table.

As an agricultural pest, the Argentine ant has also attracted considerable attention, by reason of its fondness for the secretions of plant lice and scale insects, and on account of its direct attacks on the fruit, flowers, buds, and seeds of many plants.

This ant is not a stinging ant, but can bite severely. It is not predaceous, but is very fierce and drives out or kills other species of ants.

It is in relation to the cane-growing industry that this ant promises to be of most importance. The Argentine ant appears to be very fond of the mealy bug of the sugar-cane (*Pseudococcus* [*Dactylopius*] *calceolariae*), and in this way its presence in any district is a serious menace to cane cultivation. Wherever the ant is exceedingly abundant the mealy bug of the cane is also found in large number. It appears that the mealy bug is colonized by the ant on the plant canes, this sometimes resulting in the complete destruction of the eyes of young buds where considerable damage is done.

The cotton aphis is also protected and colonized by this ant, and on this account the aphis will be less likely to be controlled by its natural enemies and thus will become a more serious pest of growing cotton.

The remedies given are few. Carbon bisulphide is effective in killing out colonies in their nests, but unless the work is performed almost simultaneously over large areas it will not accomplish much good, since old nests are frequently utilized by ants from adjacent colonies. Tapes soaked in corrosive sublimate, and cloths saturated with kerosene and wrapped around table legs, etc., serve as excellent barriers to the ant.

At the present time the Argentine ant is not known to occur in the West Indies, and it will readily be seen that every effort should be made to prevent its introduction. The laws for the fumigation of imported plants, which provide for the fumigation of all plants and packages, should prove effective in preventing the introduction of this ant in this way.

ONION GROWING IN MONTSERRAT.

Successful experiments in the cultivation of onions have been carried on in Montserrat for some years past. Seed has been obtained each year from Teneriffe, the amount imported last year being 190 lb. Onion plots are under cultivation both at Grove and Harris' Stations. At the latter station, however, the soil appeared to be too heavy for the crop, which, it is stated, gives better results on the lighter soils of the island.

The onion bed at Grove Station is $\frac{1}{10}$ acre in area. The report for 1906-7 on the experimental work carried out, states that Bengal beans were planted on this plot in March. By September this crop had formed a dense growth, which was cutlassed down and buried in the green state as manure.

The onion seeds were sown in October in raised beds, the seedlings being transplanted out later into rows 1 foot apart, at a distance of 2 inches from plant to plant. The soil, which is rather light, was made firmer before planting by treading it.

Twelve barrels or 1,672 lb. of cured onions, equal to a yield of 16,720 lb. per acre, were obtained from the plot. Eight barrels of these were shipped, and realized a return of \$3·25 per barrel, or 2¼*d.* per lb. The total cost of cultivation, including seed, was £1 5*s.* 8*d.* This represents a net return of £91 11*s.* 4*d.* per acre, which sufficiently indicates the remunerative nature of the crop, although, of course, the limited market precludes the possibility of its cultivation on any extended scale. The quantity of onions exported from Montserrat in 1906 amounted to 20,760 lb., while 59,350 lb. were shipped in 1907. Reports on the shipments state that small onions are preferred on the market, and in order to meet this demand, therefore, the seedlings should be planted very close together in the rows.

THE JAMAICA EARTHQUAKE.

Under the above title a paper was read at the Royal Geographical Society, London, in December last, by Dr. Vaughan Cornish, a gentleman well known for research work and writings in connexion with Physical Geography, etc.

Dr. Cornish happened to be in Jamaica in January 1907, at the time of the earthquake. His paper has been reprinted in the *Geographical Journal* for March, and the following is the first of one or two extracts from it that may be given in the *Agricultural News*:—

On Thursday, January 10, my wife and I arrived at Kingston on our way back from a visit to the Panama Canal, and took up our quarters in the centre of Kingston, at the Grenville Hotel, East Street. This hotel, which was built in the days of slavery, was very substantially constructed of brick, with solid walls 14 inches in thickness for their whole height of two floors, viz. a ground floor and a first floor. The roof, a sloping one, was of wooden shingles, and in the whole structure there was no chimney-stack, fires not being necessary for warmth in Kingston, and the kitchen being always separate from the dwelling-house. In front, that is to say on the west of the house, a row of massive brick arches formed a verandah to the ground floor, and supported a covered wooden balcony on the first floor. Our own room was a corner one on the first, that is to say the top floor, having an outside wall to the south, and another 14-inch brick wall on the west, with two long French windows opening into the balcony.

In this room my wife and I were sitting at half-past three in the afternoon of Monday, January 14, when I heard the noise of an electric car coming from down town, that is to say from the south. The noise increased, of course, till it was opposite the house, and then just as the rushing should have begun to diminish, there was a sudden and alarming increase of rushing and rumbling sound, accompanied by a savage tearing and rending noise. For a moment I felt no shock, and did not realize the cause of the uproar, but my wife, who was sitting nearer the wall, felt a tremor, and realized that it was an earthquake. The next instant the whole house was rocking violently; a fissure opened horizontally near the top of the west wall facing me, and a shower of brickwork fell near the threshold of the door. Had my wife hastened to the door on feeling the shock, she would probably have been struck down at the moment of emergence, as happened in so many cases that day. A cloud of dust and mortar darkened the air, and the solid 14 inch brick wall vibrated to and fro, discharging a cannonade of brickwork into the room. A lump of masonry struck me a numbing blow on the shin. A heavy mahogany wardrobe standing behind me, but facing my wife the way she stood, executed a clumsy dance, and then pitched over; and the heavy cornice sailed over our heads and struck my wife on the hip in its descent. We were being bombarded both front and rear, but, even had there been any direction in which safety could be found, we were unable to fly, for the timber floor was like quicksand beneath the feet, rising and falling, and opening and shutting, so that we could see into the unceiled room below.

Up to this point one knew that these occurrences might at any instant terminate fatally, but the really awful time came when the house seemed suddenly to lose its cohesion, and we both realized that in another second the floor would give way and the walls fall bodily upon us. At this supreme moment, with absolute suddenness, the quaking floor stiffened under our feet, our environment was instantaneously rigid and still, and the noise of the earthquake died away. We rushed from the dark and dust-laden room into the verandah, and down the steps into the sunny garden, where the earth was now quite firm beneath our feet.

We spent the next few days on the lawn by the house, and on the Thursday we left Kingston for Port Antonio, on the north of the island, the train being crowded with sick and wounded. A week later we sailed for England.

During our short and eventful stay in Jamaica, we had been much impressed by the generous spirit displayed by the colonists in the face of the great financial losses. They scrupulously refrained from exploiting the public misfortune for private profit. We were also much struck with the kindliness which they displayed to one another under very trying circumstances, as well as with the consideration which they showed towards the strangers within their gates.

On May 4, my wife having sufficiently recovered from her injuries, we set out again for Kingston, as I wished to investigate, to the best of my ability, the cause and effects of the earthquake, by which, and the subsequent fire, twelve hundred persons were killed, and a loss of about £2, 000, 000 incurred.

THE HAWK'S-BILL TURTLE.

A brief account of the turtle trade of the West Indies, the headquarters of which is at Kingston, Jamaica, was given in the *Agricultural News*, Vol. V, p. 403.

Both Green and Hawk's-bill turtles are caught on the coral reefs to the north of Jamaica, and are exported to England in limited quantities. The shell of the Green turtle is of little value, and it is from the Hawk's-bill (*Eretmochelys imbricata*) that tortoise shell is obtained. The shell of a good specimen may be worth as much as £9.

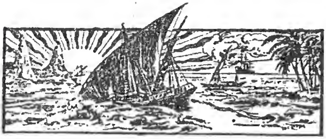
In *Bulletin 25* of the United States National Museum—'The Natural History of the Bermudas,' it is stated that, apart from their occurrence in the Caribbean Seas, the above two species of turtles are found on the American Atlantic coast from the Carolinas to Southern Brazil, and on the Pacific Coast from Southern California to Peru. The places of greatest abundance are on the shoals in the neighbourhood of low sandy beaches, or uninhabited islands.

Through the courtesy of Sir. Bickham Sweet-Escott, K.C.M.G., Governor of the Leeward Islands, an interesting account of the mode of living, etc., of the Hawk's-bill turtle, as observed in the Seychelles Islands, by Mr. J. Spurs, a naturalist with expert knowledge of the subject, was lately forwarded to the Imperial Commissioner of Agriculture.

Mr. Spurs states that the Hawk's-bill does not reach maturity till it is about twenty-two years old.

Eggs are laid by the female turtles, on three separate occasions, during the period from August to January, the total number of eggs for each turtle being about 400 per annum. These are deposited in a hole made on a sandy beach. Young turtles begin to hatch out about seven weeks after the last eggs have been laid. The turtle has many enemies, such as rats, land crabs, etc., on land, and sharks, etc., in the sea. They make at once for the high seas, and hide as much as possible under floating sea-weed. In this way only do they escape total destruction from sharks. When about five years old, the turtles return to shore, and find shelter under blocks of coral, etc.

The turtles feed on zoophytes, mussels, and small fish.



GLEANINGS.

The Government of Trinidad is paying a reward of 2*s.* 6*d.* for each mungoose (male or female) destroyed in the island.

A planter in Carriacou has this season obtained a return of 40,917 ℔. of seed-cotton of the Sea Island variety, from an area of 50 acres.

The Union-Castle Steamship Company has arranged with the Natal Government to carry citrus fruit in cold storage for the British market at a freight charge of £3 per ton of 40 cubic feet.

The first pickings of the present season's cotton crop in Barbados is reported, on the whole, to be somewhat below the average. The second picking, however, in many cases, appears to offer prospects of a better return.

From twelve hives of bees kept at the Grove Experiment Station, Montserrat, 556 ℔. of honey were extracted during 1906-7. The best hive yielded 250 ℔. A sum of £6 13*s.* 1*d.* was received for honey sold.

The rainfall returns for Montserrat indicate that the island experienced a favourable year in 1906-7. Grove Station recorded 68·18 inches, Harris' Station 76·33 inches, and Olveston 76·67 inches for the year.

An order recently passed by the Irish Board of Agriculture renders it illegal to import into Ireland any horse, ass, or mule, from Great Britain and all foreign countries, without special permission having first been obtained from the Board.

The quantity of cacao imported into the United States during 1906-7 reached 92,000,000 ℔., of which 39,000,000 ℔. came from the West Indies, while 20,000,000 ℔. were imported from Brazil, and 15,000,000 ℔. from other South American countries.

Efforts are being made by the United States Department of Agriculture to introduce the cultivation of the mangosteen (*Garcinia Mangostana*) into parts of the Panama Canal Zone, where the climate and soil conditions are suitable. (*Bureau of Plant Industry Report, 1907.*)

From the commencement of the crop season up to March 31 last, 3,084 tons of sugar, and 8,568 puncheons of molasses have been exported from Barbados, as compared with 874 tons of sugar, and 14,077 puncheons of molasses during the same period of last year.

Mr. Boyce C. Burt, formerly Science and Agricultural Master attached to the Government Laboratory at Trinidad, has been appointed Deputy Director of Agriculture for the United Provinces of Agra and Oudh, under the Government of India.

The London Trades Commissioner for Cape Colony reports a steadily increasing demand for the calabash pipe in England, and is of opinion that 200,000 to 250,000 bowls per annum will be required for the market. The Commissioner believes that these bowls should command a price of from £25 to £30 per thousand.

A correspondent, writing to the Jamaica *Daily Telegraph*, reports very favourably on the prospects of the Sea Island cotton crop in St. Andrew parish. If the return is as good as it now promises to be, there is no doubt but that the Sea Island cotton area for the 1908-9 season will be considerably extended.

Enquiry was recently made from British Guiana with regard to methods of utilization of rice straw. Straw from the rice-growing districts of the United States, it may be mentioned, has of late years been baled and placed on the market for packing purposes. Rice straw, too, has considerable value for feeding stock.

The *Chemist and Druggist* computes that the world's demand for camphor reaches 10,600,000 ℔. annually, of which 70 per cent. is utilized for celluloid manufacture, 2 per cent. in gun-cotton works, 15 per cent. for disinfecting purposes, and 13 per cent. for medicinal preparations. At present the output from Formosa reaches about 70 per cent. of the above total.

The area devoted to sugar cultivation in the Australian States of Queensland and New South Wales appears of late to have been rapidly diminishing. This is stated to be due to labour difficulties consequent on the deportation of indentured labour from the South Sea Islands. White labour does not take favourably to sugar cultivation, but prefers cattle and sheep industries.

Castilloa rubber trees appear to do well in Cuba, although their value does not seem to be recognized by many planters on whose estates the young trees grow wild. The chief of the Botanical Department at the Agricultural Experiment Station has recommended that Castilloa trees be grown as shade for tobacco plants in place of many worthless trees that are now used for this purpose. (*Cuba Review.*)

At the Durham (England) Dairy Research Station experiments have lately been carried out in regard to the composition and properties of the milk of newly calved cows. As the result of these investigations it was concluded that at the end of three complete days after calving, the milk of the cow loses its 'colostrum' character, and is again of normal composition.

There is a ready market for sweet potatos in the United States, and large quantities of this crop are grown in California. Experiments in shipping sweet potatos to the Pacific Coast States have lately been made from Hawaii. Imported produce of this kind sells best from April to August, during which months it does not compete with the home-grown crop. The first sweet potatos on the market of these States, it is reported, command a price of $50 to $60 per ton.

ZAPUPE FIBRE PLANT.

During the past two or three years increasing attention has been drawn to a fibre plant of the *Agave* genus which is being cultivated in Mexico, more especially in the State of Santa Cruz, with most profitable results. The specific identity of the plant, however, has not yet been established. The plant is described as being very similar in appearance to the sisal hemp, but differs from the latter in producing a larger number of leaves, which are also longer and more fleshy. A recent number of the *Kew Bulletin* states that a plant has been received at Kew, and is making good growth in the gardens.

In view of the possibility that the Zapupe plant might be found a suitable and remunerative crop for cultivation in some of the British West Indies, a report dealing with the subject, prepared by the British Consul at Vera Cruz, was lately forwarded to the Imperial Commissioner of Agriculture from the Colonial Office. The particulars given below have been abstracted from this report:—

Although the first Mexican experiments in the growth of zapupe began only in 1902, yet during the past two or three years at least 4,000 to 5,000 acres of ground have been cleared and planted in the State of Vera Cruz alone, and the reports on the fibres obtained have been so promising that the planted area is still rapidly extending. Owing to the larger yield of leaf and the more rapid growth of the zapupe, it is expected that it will prove a far more remunerative crop than sisal. Whereas fully six years must elapse before the first crop of sisal leaves can be gathered, the zapupe yields its first return in from three to four years from planting. Further, although the weight of fibre per leaf is considerably less in the case of the zapupe than with the sisal, yet owing to the much greater number of leaves on the zapupe, the latter is reported to give an average of 2½ lb. of fibre per plant per annum, as compared with 1½ lb. of fibre obtained from the sisal. Extra labour and expense, however, would be entailed in the case of the zapupe, since the leaves are obtained in three cuttings per annum, whereas the sisal plant gives its full yield in two cuttings.

Zapupe seems to prefer a moderately light soil, of not too porous a nature, on gently sloping hill-sides. Soil too sandy or too clayey in nature should be avoided. The land should be well drained, and though it is reported to do well on poor soil, better results are obtained on land fairly rich. The plant flourishes in a warm and humid atmosphere, and will not grow at too high an elevation.

No great trouble is entailed in the cultivation or propagation of the zapupe. Young shoots given off by the plant are taken when they are but a few inches high, and set out in nurseries. Here they remain and grow for about nine months, when they are transplanted to the field. A furrow is made with a plough, the young plants are set out at distances of 5 feet apart, and the earth is banked up around them by another turn of the plough. The furrows in which the rows of plants are set are about 7 feet apart, and at these distances, a little over 1,000 plants are set out per acre. The cost of planting an acre, including the purchase of about 1,000 shoots, tending these in the nursery, preparing ground, and transplanting would amount to about $50.

As already mentioned, the first cutting of leaves would be obtained in about four years, and three cuttings take place each year. Each plant produces about 2½ lb. of fibre annually (representing a return of somewhat more than a ton per acre), and continues productive for a term of eight to ten years.

Up to the present, the uses to which zapupe fibre have been applied have been somewhat limited. Recent experiments, however, have demonstrated its adaptability for working up into rope and 'binder twine,' for which it is reported to possess the necessary toughness and tensile strength in a remarkable degree.

The gigantic strides that have taken place in the sisal hemp industry of Yucatan should undoubtedly prove encouraging to those who propose to take up what appears to be an even more promising cultivation. In 1880, only 18,179 tons of sisal, valued at £177,757 were exported from Yucatan. Ten years later the value of the shipments reached £523,030; in 1899 the exports were valued at £2,021,124, and in 1906 they reached a total of £2,724,752.

LEMON GRASS.

The cultivation of lemon grass (*Andropogon citratus*), which has received some slight attention in Montserrat, was briefly described in an article that appeared in the *Agricultural News* (Vol. V, p. 27). Some further particulars are given in the *Quarterly Journal* of the Bengal Department of Agriculture for January last.

Lemon grass is largely grown for its oil in Ceylon. It does not seem to be particular as to soil or situation, and will grow at any elevation up to 1,600 feet. The soil that gives the best returns, however, appears to be a sandy loam.

Lemon grass is usually propagated by offsets from clumps of the mature grass. The best results are obtained from clumps two or three years old. The stools are divided into slips and planted into holes at distances of 2 or 3 feet apart. After planting, the soil should be trodden down firmly around the plants. Necessary weeding operations should be carried out at least twice a year.

In the cultivation of this crop little or no expenditure need be made in the purchase of manure. An occasional application of cattle dung, however, is said to have good results, and after distillation of the essential oil, the grass may be returned to the ground as a mulch. In Ceylon a first cutting of grass is made about nine months after planting. Two or three cuttings a year can be made. Replanting is necessary after the third year.

The oil is generally distilled directly the grass has been cut, but it is stated that better results are obtained by keeping the grass for a day before commencing this operation. The process of distillation, although very simple, takes four or five hours to complete. After distillation, the crude oil is filtered and then run into bottles or casks ready for the market. The yield of oil varies greatly, sometimes amounting to 0·2 per cent. of the weight of the grass. A good yield is about 100 quarts, or 4,000 fluid oz. per acre. At 6*d.* per oz., this represents a return of £100 per acre.

Lemon grass oil is generally employed in the perfuming of scented soaps and pomades. It is also largely used in the adulteration of verbena oil. The product has largely increased in value of late years, and in Ceylon a price of from 6*d.* to 8*d.* an ounce can be relied on. A sample of oil sent from Montserrat was valued by London brokers at 4¾*d.* per oz, and it was stated that there would be no difficulty in disposing of at least 500 lb. of the product.

NITROGEN AS A PLANT FOOD.

No plant food is of more importance than nitrogen, since this is the element removed from the soil in largest quantity by the great majority of crops. The available supply of nitrogen in most soils, too, is very readily exhausted by continuous crop growing, and it is the most costly of manurial elements to replace. As most planters are aware, an economical method of increasing the store of nitrogen in the soil is by including in the rotation an occasional crop of leguminous plants, such as cow peas, velvet beans, ground nuts, etc., which thus serves a double purpose. The following notes dealing with the subject of nitrogen as a plant food, are taken from a lengthy article entitled 'Relation of Nutrition to the Health of Plants', that appeared in the *Yearbook* of the United States Department of Agriculture, 1901:—

Nitrogen is an important constituent both of plant and animal food. It is essential to the formation of albuminoids and of various constituents of the protoplasm or living substance of the plant. By far the most important source of nitrogen for most agricultural crops, under ordinary circumstances, is the nitrates of the soil. The main source of nitrogen in the soil, besides the decay of organic matter, is the fixation of the nitrogen of the atmosphere through the agency of micro-organisms. Though about 75 per cent. of the volume of the air is nitrogen, it does not become available to ordinary crops. In the case of leguminous crops, however, nitrogen is absorbed by micro-organisms, and converted into nitrates or some other high nitrogen compound which can then be utilized as plant food by the growing crop. Many varieties of bacteria and fungi have been found which can absorb free nitrogen if they are furnished with carbohydrate food. This is usually derived from decomposing vegetable matter or from living root cells. The bacteria live on, or in, the roots of the leguminous plants, forming swellings or tubercles on them. The great importance of this to agriculture is at once apparent, and the study of the conditions favouring the growth of these beneficial mico-organisms is of the highest practical value.

The lack of a sufficient supply of nitrogen to growing plants is usually manifested by reduced leaf and stem growth on the part of the crop, and a tendency to the production of flowers and fruit at a very early period, though the amount of fruit produced is correspondingly small. In this respect the effect of a lack of nitrogen is similar to that of a lack of water. On the other hand, an excess of nitrogen acts like an excess of water, stimulating the production of vegetative growth at the expense of flowers and fruit. This growth is rich in nitrogenous matter and water, and is very easily injured by unfavourable conditions. It is a well-known fact, for example, that many cereal crops have not only soft leaves and weak stems under such conditions, but the plants are more subject to rust and mildew, and various other parasitic diseases. This is true, not only of cereals, but practically of all ordinary plants. In culture under glass these conditions can be controlled and remedied, but in the field it is more difficult. Drainage and methods of cultivation also in a measure afford means of check to rapid and succulent growth in wet seasons.

Besides these general effects of the lack or excess of nitrogen on growth, attention should be directed to some obscure diseases where nitrogen assimilation appears to be involved. Among these may be mentioned 'mosaic' disease of tobacco, winter blight of tomatos, 'die back' of the orange, and California vine disease. As already stated, plants obtain most of their nitrogen through the absorption of nitrates by the roots. The dilute solutions pass up through the stem to the leaves, where, through the aid of the chlorophyll, the nitric acid unites with sugars to form the more highly organized nitrogen compounds such as amides and proteids, which serve as food for the growing cells. The young cells cannot use the original soil nitrates any more than animals can, so that if anything interferes with the process of proteid organization, nitrogen starvation will follow, even in the presence of large quantities of nitrate. For the organization of proteids, sugars are required, and sugar cannot be produced unless the chloroplasts are in good working order, and exposed to light and heat of the proper intensity. The proper mineral nutrients—lime, potash, phosphoric acid, magnesium, iron, etc., must always be present. With insufficient light or heat there is no proteid formation from nitrates, neither is there any in albino leaves, or those devoid of chlorophyll. In both of these cases, therefore, nitrates accumulate in the plant. With the renewal of the activity of the chloroplasts the accumulation of nitrates is gradually worked up into proteids, except, of course, in albino leaves, where the chloroplasts may have permanently lost their functional activity. In such cases the cells usually remain comparatively rich in nitrates.

It is known from experimental investigation that a large excess in nitrates may in itself cause a yellowing in the chloroplasts, and thus serve directly to prevent further nitrate assimilation. At first, plants overfed with nitrate of soda, or other strong nitrogenous fertilizer, become a brighter green and grow rapidly, but as the nitrate accumulates in the cells faster than it is used, the leaves begin to turn yellow on the edges and along the vascular bundles, growth is checked and the plant dies back. This is especially likely to happen in the the case of crops that are not gross feeders. Yellowing and death of the edges of leaves (though not following a stimulated growth) is caused by an over-application of almost any quickly soluble salt (potash, sodium chloride, etc.). In the case of the orange, it has been observed that the disease known as 'die back' appears to be greatly favoured, if not caused, by excessive fertilization with organic manures rich in nitrogen. It is not known whether nitrogen from mineral fertilizers has the some effect.

Webber also observes that on the poor sandy soils of Florida, sulphate of ammonia and nitrate of soda stimulate not only vegetative growth of the orange, but the production of fruit as well, while organic manures are more likely to stimulate vegetative growth at the expense of fruit, the fruit produced with organic nitrogen being coarser, thicker skinned, and of poorer quality than when mineral fertilizers are used. Pen manure acts in this way like organic manures, as might be expected.

RUBBER PRODUCTION IN PARA.

The Governor of Para, in a recent message to the Legislative Assembly of Brazil, gave the following figures with reference to the output of rubber during 1906-7:—

The rubber production of Para in the season 1906-7 amounted to 11,467 tons, valued at £3,392,000. In 1905-6 the output of rubber from this State was 11,832 tons, valued at £3,623,440. The total rubber crop of Brazil in 1906-7 amounted to 37,159 tons. Practically the whole of it was exported to New York, Liverpool, Hamburg, Havre, and Antwerp. The quantity of rubber on hand on June 30 last was about 165 tons.

RICE CULTURE IN THE UNITED STATES.

Rice growing has become an important industry in the United States, notably in Louisiana, Texas, the Carolinas, and Georgia. Low-lying lands, easily irrigated and drained, naturally constitute the chief part of the area given over to rice culture, and it is stated that the best results are obtained on medium loamy soils, underlaid by a stiff subsoil. A rice that has given excellent results in the States is a Japanese variety, known as Kinshu. Carolina Golden Rice is also famous for its yield and quality.

A British *Consular Report* (No. 625, Miscellaneous Series) was issued sometime ago, giving a full and elaborate account of the methods of cultivation, irrigation, harvesting, threshing, etc., in general practice among the rice growers of the States. The following extracts, which may be of some interest to cultivators in British Guiana and other parts of these colonies where rice is grown, have been taken from this report:—

For purposes of irrigation, rice fields are surrounded by a marginal canal, and are divided up into strips of land about 50 feet wide and of various lengths, by ditches which extend from the marginal canal on one side of the field to the marginal canal on the other These ditches are about 3 feet wide and 3 to 4 feet deep.

The surface of the field should have a uniform grade in order to be properly irrigated. An uneven surface requires more labour, produces smaller crops, and in the end damages the crop itself. Too much water in some places and too little in others soon show injurious effects on the soil. On such a field the crop does not ripen uniformly; the field shows alternate patches of yellow and green, and the grain when harvested is found very inferior in quality. The planter whose crop is uniform in quality knows the value of applying water evenly over the entire surface. The rice lands of the Gulf and Atlantic States have a very gentle slope, and do not, as a rule, require much grading.

Drainage is very essential to rice culture. Planting, cultivating, and harvesting all depend, to a considerable extent, on drainage. On grounds insufficiently drained planting is never well done, for the ground cannot be put in condition. Cultivation is greatly impeded, men cannot go on the fields to work, the ground cannot be stirred, and weeds and noxious grasses flourish.

Before the crop can be harvested it is necessary that the field be drained. When the land is wet the harvester works at a great disadvantage; the fields are dug up by the labourers and the surface becomes sodden and sour. On account of insufficient drainage, grain has often to be taken from the fields to some high place where it is stacked and cured.

In the Carolinas and Georgia the lands, as a rule, are prepared for planting in December and January. The ground is ploughed 3 or 4 inches deep, run over with a disc harrow, and then by a roller which breaks up the clods, and makes the surface level and compact. In different sections the time for ploughing varies and the methods differ. In some instances the soil is so stiff that it is necessary to flood the fields before they can be ploughed.

Rice is a shallow feeder. Some planters are therefore of the opinion that deep ploughing is unnecessary. It might appear, however, that deep ploughing would give new land each year for the plant. In upland culture the ground is prepared as it is for corn, and in North Carolina the crop is raised in much the same way.

On lands that are flooded by rivers which carry a rich sediment, sufficient nutritive material may be deposited to ensure its continued fertility. On lands not so favourably situated the soil becomes greatly impoverished if some fertilizer is not used. Many different kinds of fertilizers are in use in the rice belt. Among these are cotton seed meal, dried blood, bone meal, kainit and tankage. The last named is a special mixture for these lands. Most fertilizers contain a large percentage of potash, and are spread with very satisfactory results.

Rice is generally planted with a drill in rows which are 14 inches apart, and covered by means of a harrow. The drill is ganged to put in from 54 to 81 lb. of unhulled seed to the acre. In some fields trenches about 2 inches deep and 14 inches apart are made with trenching hoes and the seed dropped in and covered. Sometimes, in what is known as the open trench method, the trench is left open, in order to save time and labour, the seed having been clayed, in order to prevent it from floating when the field is flooded. Claying consists in stirring the seed in clayed water until a coat of clay covers each grain.

In the North Carolina uplands the common corn drill is used in planting. Planting with a drill insures equal distribution, one of the essentials for the greatest productivity of a given piece of land. The amount sown per acre varies; the average, however, is estimated at 3 bushels.

One of the most important features in the culture of rice is flooding. Many planters flood the field immediately after the seed is sown, planting and watering on the same day. This first water, called the 'sprout flow,' protects the grain from the birds and causes germination. The sprout flow is left on the field till the seed sprouts In early planting this requires from six to eight days. Rice planted in June sprouts in twenty-four hours. When the sprout flow is taken off the field remains without water until the plants come up, and the rows across the field can be plainly seen when the water is again turned on. This is called 'stretch flow', and remains on the field until the plants are 5½ or 6 inches in height. This requires from two to six days, the time depending very largely on weather conditions. The stretch flow serves the double purpose of rendering nourishment available to the rice plant, and impeding and destroying the growth of weeds and injurious grasses.

When the plants have grown sufficiently high under the stretch flow the water is gradually lowered to an average depth of 4 inches, where it remains from thirteen to thirty days according to the strength of the soil, the condition of the plants, and the temperature. The stretch flow is taken off, and the following period of forty or fifty days, when the crop grows under dry conditions, is known as the 'dry growth.' During this period the crop is cultivated with horse and hand hoes. All weeds, grasses, and self-sown rice are uprooted and the ground is thoroughly stirred. It is during the 'dry growth' that conditions are most favourable for grubs, and an intermediate flow is sometimes necessary to protect the crop from these pests.

When the plant begins to joint, the 'harvest flow' is turned on. First the water is raised till it covers all the high places in the fields, and is held so for three, four or five days, after which it is lowered to the level reached by the stretch flow. In a few days the water is again raised till it almost touches the rice heads, where it remains till the grain is ripe. The harvest flow extends over sixty-five days, and in order that the water may not become stagnant, it is shifted every ten days. When the grain is ripe the heads bend low. The field is then drained for harvest.

MARKET REPORTS.

London,—March 31, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., March 31, 1908; Messrs. E. A. de Pass & Co., March 20, 1908.

Arrowroot—2½*d.* to 3¾*d.*
Balata—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8 per lb.
Bees'-wax—Good quality, £7 10*s.* to £7 15*s.* per cwt.
Cacao—Trinidad, 80/- to 90/- per cwt.; Grenada, 72/- to 80/- per cwt.
Coffee—Santos, 28/6 per cwt.; Jamaica, 40*s.* 6*d.* to 60*s.*
Copra—West Indian, £16 10*s.* per ton.
Cotton—St. Vincent, 18*d.* to 20*d.*; Barbados, 18¼*d.* to 19*d.*; St. Kitt's, 16*d.* to 17½*d.*; Montserrat, 16*d.* to 16½*d.*
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—4/6 to 5/ per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—14/- to 20/- per box.
  Oranges—Jamaica, 5/ to 6/- per box.
Fustic—£3 10*s.* to £4 10*s.* per ton.
Honey—20*s.* to 23*s.* per cwt.
Isinglass—West India lump, 1/10 to 2/- per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £12 12*s.* 6*d.* per cask of 108 gallons; Distilled oil, 1/11 per lb.; hand-pressed, 4/3 to 4/5 per lb.
Logwood—£3 10*s.* to £4 5*s.* per ton; Roots, £2 10*s.* to £3 10*s.* per ton.
Mace—1/- to 1/10 per lb.
Nutmegs—68's to 69's, 7*d.* to 9*d.*; 75's, 6*d.* to 6½*d.*; 105's, 4¼*d.*; 111's to 115's, 3¾*d.* to 4¼*d.*; 121's, 3½*d.*; 138's, 3¼*d.*
Pimento—2⅜*d.* per lb.
Rum—Jamaica, 2/10 to 3/-; Demerara, 1/2½ to 1/4; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, 14*s.* 10*d.*; Molasses, 14/- to 14/6.

New York,—March 20, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 15¾c. to 20c.; Grenada, 16c. to 17½c.; Trinidad, 15¾c. to 18c.; Jamaica, 14c. to 15¼c. per lb.
Cocoa-nuts—Jamaica, select, $25·00 to $26·00; culls, $15·00; Trinidad, $24·00 to $25·00; culls, $16·00 per M.
Coffee—Jamaica, good washed, 8½c. to 11c.; good ordinary, 6⅞c. to 8½c. per lb.
Ginger—11c. to 14c. per lb.
Goat Skins—Jamaica, 55c.; St. Thomas, St. Croix, St. Kitt's, 53c. to 55c., dry flint; 30c. to 42c., dry salted.
Grape Fruit—Jamaicas, $1·75 to $2·50 per box and $4·50 to $5·50 per barrel.
Limes—Dominica, $4·25 to $5·75 per barrel.
Mace—30c. to 35c. per lb.
Nutmegs—110's, 9½c. to 9¾c. per lb.
Oranges—Jamaica, $2·50 to $4·00 per barrel.
Pimento—5c. per lb.
Sugar—Centrifugals, 96°, 4¼c.; Muscovados, 89°, 3·80c.; Molasses, 89°, 3c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., March 30 1908; Messrs. T. S. Garraway & Co., April 13, 1908.

Arrowroot—St. Vincent, $4·00 to $4·20 per 100 lb.
Cacao—Dominica, $15·00 to $16·00 per 100 lb.
Cocoa-nuts—$16·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·55 to $1·70 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—12c.; Fancy, 15c. per gallon.
Onions—Madeira, $2·15 to $2·40 per 100 lb.
Potatos, English—$2·40 to $3·00 per 160 lb.
Peas—Split, $6·20 to $6·50; Canada, $3·36 to $3·35 per bag.
Rice—Demerara, $5·60 to $5·65 (180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89°, $1·90 per 100 lb., package included; Dark crystals, $2·60; Centrifugals, $2·30 to $2·60 per 100 lb.

British Guiana,—March 31, 1908.—Messrs. Sandbach, Parker & Co.; Messrs. Wieting & Richter, April 4, 1908.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 33c. to 35c.; Demerara sheet, 54c. per lb.
Cacao—Native, 19c. to 20c. per lb.
Cassava—No stock.
Cassava Starch—$7·56 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 10c.; Jamaica, 12c. per lb.
Dhal—$5·00 to $5·25 per bag of 168 lb.
Eddos—$1·12 per barrel.
Molasses—Yellow, 17c. to 19c.; Dark, 15c to 16c.
Onions—Madeira, 4c.; Lisbon, 4c to 4½c. per lb.; Dutch, 3c.
Plantains—20c. to 64c. per bunch.
Potatos,—English, $2·40 per barrel.
Potatos, Sweet—Barbados, $1·00 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $5·25 for good; Seeta, $6·00 per bag.
Split Peas—$6·20 to $6·25 per bag (210 lb.); Lisbon, $4·50.
Tannias—$2·52 to $3·12 per bag.
Yams—White, $2.16 to $2·40; Buck, $3·24 per bag.
Sugar—Dark crystals, $2·94 to $2·97; Yellow, $2·90 to $3·00; White, $3·50 to $3·60; Molasses, $1·70 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·24 to $6·00 per M.
———**Cordwood**—$2·40 to $2·64 per ton.

Trinidad,—March 21, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$17·00 to $20·00 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—72c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·60 to $2·80 per 100 lb.
Dhal—$5·00 to $5·25 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 lb. (retail).
Potatos, English—$1·15 to $1·25 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—$5·00 to $5·05 per 100 lb.

AGRICULTURAL NEWS.

A FORTNIGHTLY REVIEW
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Blood-Sucking Flies and Ticks.

FOLLOWING on the discoveries of the past few years in regard to the part played by many insects in the transmission of disease, considerable interest has been aroused, and great efforts are being made by medical men, Government officials, and entomologists to increase, as far as possible, the amount of knowledge bearing on this subject.

With this object in view, the Colonial Office has during the past year or more, sent out requests for collections of certain kinds of insects, together with directions prepared by the British Museum (Natural History Department) for collecting, preserving and forwarding these insects.

The insects most actively concerned in the transmission of disease belong to the order Diptera or true flies. These insects have only two wings and possess mouthparts for sucking. In addition to the flies the ticks are very serious pests. Although they are not, strictly speaking, insects, they are closely related, and are similar in their manner of transmitting certain diseases.

Among the Diptera may be mentioned the mosquitos, and of these, the yellow fever mosquito (*Stegomyia*), the malarial mosquito (*Anopheles*), and the filarial mosquito (*Culex*) are the most important. Other insects of this order which carry disease from the infected to the healthy are the Tse-tse flies of South Africa, one of which conveys the Nagana disease which is fatal to animals, and another the sleeping sickness, equally fatal to man.

In all these cases, the disease is the result of an organism which must have been taken from an infected individual by an insect and, after the lapse of a sufficient time for the parasitic organism to undergo certain developmental changes, transmitted, in the process of biting, to a healthy individual. In the case of mosquitos it is only the female that is able to pierce the skin and suck blood. In the Tse-tse fly both sexes are able to bite and both are able to transmit the disease. In the case of filaria the parasite is a worm, in malaria a protozoon, and though in yellow fever the organism has not been definitely determined, it has been found that a *Stegomyia* mosquito, after biting an infected person cannot transmit the infection for a certain period of time afterwards, and it is reasoned that changes are going forward with this mosquito, in the same way as with *Culex* and *Anopheles* under similar conditions.

In the case of the diseases carried by the Tse-tse fly, the parasites are minute organisms known as Trypanosomes, which are conveyed from wild big-game animals to domestic animals. The native wild animals are tolerant of the disease, while imported animals, such as horses and cattle, are fatally affected by it.

In the case of the insects already mentioned as carriers of diseases, it happens that the adult insect which attacks the infected host transmits the disease to the next host: but in the case of the ticks, which are closely related to the insects, and are very important carriers of disease, the adult female when it has gorged itself with the blood of the infected animals, does not carry the disease directly to the new host.

When the female tick has become fully gorged, she drops to the ground, and deposits eggs, and the young ticks which hatch from them carry the infection.

The parasites carried by ticks are minute organisms, various species of a protozoon called piroplasma, and the diseases caused by them are spoken of as Piroplasmosis. The disease of cattle called variously Texas fever, tick fever, blackwater, and redwater in different places, heart water in sheep, and malignant jaundice in dogs in Africa, are all forms of piroplasmosis, and there is also one disease caused by piroplasma which attacks man. This is the tick fever, spotted fever, or Rocky Mountain fever, as it is called, which runs throughout the western half of the United States.

It is of the utmost importance that the carriers of these disease-organisms should be known, and it is for this purpose that efforts are being made to enlist the services of volunteer collectors in all the colonies, but more especially in the tropics.

The circulars which have been prepared by the British Museum (Natural History Department) give directions for collecting, preserving, and forwarding insects for the purpose of study, and include lists of apparatus needed, give illustrations of the manner of pinning and setting insects, and in short, contain all the information needed by the most unpractised beginners to enable them to prepare specimens suitable for study.

Careful collections in newly opened districts, and the careful identification of the specimens obtained will enable specialists to state the probabilities of any known diseases appearing, and will greatly help in dealing with the better-known diseases occurring in those localities.

In this connexion it may be mentioned that some two years ago the Bureau of Entomology of the United States Department of Agriculture sent Mr. August Busck to the West Indies for the purpose of collecting mosquitos, in order that the species representative of different localities might be better known, and precautions taken against the importation of any diseases that might be transmitted by them.

As a result of the interest in the study of mosquitos, a very large amount of literature has appeared during the past few years. Perhaps the greatest publication of all is Theobald's *Monograph on the Culicidae of the World.* This is a work in four volumes of text and one volume of plates. An examination of the lists given in this work will convey some idea of the amount of material that is being collected and sent forward for study from many parts of the world.

SUGAR INDUSTRY.

Sugar Consumption in the United States.

Messrs. Willett & Gray have published a report on the sugar trade of the United States for the year 1907.

From the statistical tables given it is seen that the total consumption of sugar during the year was 2,293,979 tons, an increase of 129,966 tons, or 4·538 per cent., as compared with the amount consumed in 1906. The increase compared with the consumption of 1905 is 231,797 tons, or 8·6 per cent.

Full duty was paid on 355,297 tons of the sugar consumed, while the amount of sugar on which a concession of duty was allowed, was 1,351,000 tons. The consumption of duty-free sugar (from Hawaii and Porto Rico) was 1,287,582 tons.

Cuba contributed 1,340,400 tons; the Hawaiian Islands 418,102 tons; Porto Rico 212,852 tons; and the Philippine Islands 10,700 tons. The amount of home-grown cane sugar consumed was 264,968 tons, and of home-grown beet sugar 375,410 lb. The consumption of maple sugar amounted to 10,000 tons.

The total amount of refined sugar consumed during the year was 2,843,928 tons. Of this no less than 2,841,246 tons (or 99·9 per cent.) were refined in the States.

The average consumption of sugar per head of United States population during 1907 was 77·54 lb. compared with 76·1 lb. in 1906, and 70·5 lb. in 1905.

Since 1897, the full duty on sugar imported into the United States has been 1·685c. per lb., 96° test. As already mentioned, sugar from Hawaii and Porto Rico pay no duty, while that imported from the Philippines is allowed a reduction of 25 per cent., and from Cuba, 20 per cent. Sugar from all other countries pays full duty.

Cuban Sugar Crop.

During the past few months various estimates have been made as to the extent of the present season's sugar crop in Cuba, but all have more or less agreed that there would be a shortage as compared with last year. According to most recent reports, those best qualified to judge would now definitely place the crop below 1,000,000 tons.

The United States Consul-General at Havana, writing under date of March 13, states:—

The great majority of planters and others interested assert that 950,000 tons will represent the maximum, and 850,000 tons the minimum crop. There is good reason for believing that 900,000 tons is not too low an estimate, for it is known that cane-cutting has practically ceased in many districts, and that some of the mills will stop working on April 1, or thereabouts.

Under the most favourable conditions the grinding season will be finished by the end of April. The latest returns available dealing with the shipments and stock on hand for 1908 up to March 1, show a falling-off of nearly 40 per cent., as compared with the figures for the same period of 1907. If this shortage is maintained to the end of the season the volume of the crop will be below 900,000 tons.

Discussing the same subject the New York *Journal of Commerce* says:—

The United States ordinarily depend upon Cuba for about half their consumption, but this year, the crop, on account of drought and other causes, will, as far as can be estimated, be from 400,000, to 500,000 tons short. The output last year was 1,427,000 tons, and conservative estimates for 1908 have been lowered to from 900,000 to 1,000,000 tons. To make matters worse, Porto Rico, San Domingo, and the British West Indies all show reduced yields, so that there is a total shortage of 500,000 to 600,000 tons. A significant indication of the situation is the fact, that, owing to unfavourable conditions, thirty-three central factories have ceased grinding in Cuba.

Stripping Sugar-canes.

A note was given in the *Agricultural News*, Vol. VI, p. 98, on experiments conducted in Hawaii with the view of ascertaining the effect on the crop return of stripping trash from the sugar-cane. Further tests on the same lines have been conducted since 1906, and the results published in ***Bulletin No. 25*** of the Division of Agriculture and Chemistry, Hawaii.

Stripping was carried out both with plant canes and the following ratoon crop. The young canes were planted in June 1904, and the crop gathered in February 1906. The ratoons were cut back in July 1906, and harvested in January 1908. Each crop was stripped on three different occasions. Briefly stated, the following are the principal results:—

(1) In the case of the plant cane crop, the weight of unstripped canes obtained per acre was 24·31 tons greater than the weight of stripped canes, while in the case of the ratoon crop, the unstripped area gave a return exceeding by 13·68 tons per acre the yield given by the stripped area.

(2) With the plant cane crop, the percentage of sucrose in the juice was 17·7 in the unstripped canes, as compared with 16·8 in the stripped canes. With the ratoon crop, the difference in favour of the unstripped canes was 1·0 per cent.

(3) There was a slightly higher standard of purity in the case of the juice of the unstripped canes, compared with that from the stripped portion of the crops. The average of the two crops in the case of the unstripped canes was 89·1, while the juice of the stripped canes showed a purity of 88·1 per cent.

(4) The unstripped canes gave a return of 4·10 tons of sugar per acre more than the stripped canes in the plant crop, while in the case of the ratoon crop the unstripped canes gave 2·36 tons of sugar per acre more than those stripped.

(5) The number of dead canes on the stripped area was greater by 2,539 per acre than on the unstripped area with the plant cane crop, and by 1,457 per acre with the ratoon crop.

It is probable that the reduced yield of sugar per acre is chiefly due to the much greater number of dead canes on the stripped area. As far as can be gathered, it would appear that 323,800 tons of sugar were obtained from stripped cane in Hawaiian plantations in 1907. It is remarked in the *Bulletin* that if the average percentage of loss from stripping was no more than one-third of that which resulted in the experiments in question, then the practice cost those plantations, for one year only, nearly $3,000,000.

SUGAR AND COTTON IN ST. KITT'S-NEVIS AND THE VIRGIN ISLANDS.

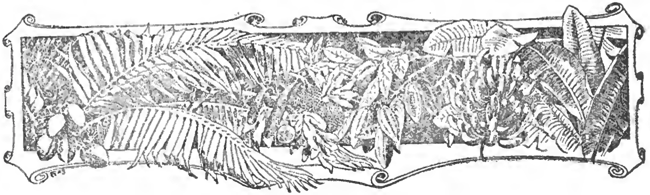
A recent issue of the *Weekly Reports* of the Canadian Department of Trade and Commerce contains the following report from the Commercial Agent of the Dominion at St. Kitt's, on the sugar, molasses, and cotton output in St. Kitt's-Nevis and the Virgin Islands during the past year:—

The sugar crop for the season just closed was a fairly good one, and the bulk found its way to Canadian markets. Owing to favourable conditions in the United Kingdom, about 2,797 tons were shipped to Greenock and London, while for the first time in the shipments to Canada, a new departure was made by 433 tons being forwarded to Montreal, instead of all being consigned, as heretofore, to Halifax.

The total sugar exported for the year amounted to 14,177 tons, of which Canada received 11,188, the United Kingdom 2,797, and other places 192 tons.

The molasses crop was again disappointing, the output being smaller in proportion to the quantity of sugar made than is the case in other islands. Of the 2,157 puncheons shipped, 1,263 were forwarded to Canada, and 894 elsewhere. In regard to this article also, there has been a change in the method of disposal, as while in former years the greater portion of the crop was sold locally at fixed prices on definite orders from Canadian buyers, this season, owing to the absence of such orders, the bulk was shipped on consignment.

The output of cotton from this island, Nevis and Anguilla, during the last season, showed a gratifying increase on the previous year's production, and this without any appreciable diminution in the acreage under cane cultivation, at least in St. Kitt's; and as prices were fairly good, the results have proved of substantial benefit to the planters. The crop obtained in St. Kitt's was 269,109 lb.; in Nevis, 136,670 lb.; and in Anguilla, 59,666 lb. The whole was exported to the United Kingdom.



WEST INDIAN FRUIT

SHIPMENTS OF PAPAWS.

Experiments designed to ascertain the practicability of shipping papaws from Hawaii to San Francisco have been carried out, and are reported upon in *Bulletin 14* of the Hawaiian Experiment Station.

The papaw is a fruit which offers good prospects of finding a ready market, since it is one which is practically certain to be popular with consumers.

The results of the trials would indicate that under proper conditions, papaws carefully selected, handled and packed, could be successfully shipped such a distance as that from Hawaii to the Pacific coast.

It was found that fruit of the long type was more suitable for shipping than round fruits, being less liable to damage and consequent decay. Provided the voyage is direct and no transhipment is involved the best stage at which to gather the fruit is just when it is beginning to show slight tinges of yellow. If the voyage is longer, and the fruit has to undergo transhipment, it is recommended that the papaws be gathered green.

The fruits should be wrapped separately in glazed paper, with an exterior wrapper of crimped straw-board if possible. Papaws will undergo refrigeration in shipment without deterioration in flavour.

INDIAN BANANAS: PROSPECTIVE EXPORT TO ENGLAND.

The United States Consul at Calcutta, in a report published under date of March last, states that some of the more enterprising banana growers of India are giving considerable attention to the question of developing an export trade in this fruit to Great Britain. The Consul writes:—

It is claimed that vessels properly fitted up can reach the Liverpool market from Calcutta in twenty-five days, and that several kinds of fruits, especially the plantain, can be laid down in Liverpool to compete with the West Indian banana, which now monopolizes the English market. It is stated that one firm trading between the West Indies and Liverpool has thirteen vessels, each of 3,000 to 5,000 tons capacity, and each one capable of stowing away 60,000 bunches of bananas, without crushing or bruising the fruit. This trade has increased to vast proportions, and it is urged that India should have part of it.

The native East Indian banana is smaller by half than the fruit grown in Jamaica, Costa Rica, and along the coast lines of Central America, but the former is as rich in flavour. In fact it possesses a 'bouquet' all its own, and would, it is believed, become popular at once with European consumers. The East Indian banana, both yellow and red, grows abundantly throughout the southern provinces and the supply could be made practically unlimited. All the Indian needs to learn is how to cut the bunches at the right time, to handle the fruit without bruising, and so that it can be landed in twenty-five days on the English market before it begins to get yellow. The only thing lacking, it is claimed, is the necessary transportation, and this will be forthcoming if encouraged. The fruit is in India and needs a market, and if enough money is raised to back the enterprise, it is believed that India can get her share of the banana trade of Europe and hold it.

CITRUS FRUIT IN NEW SOUTH WALES.

Efforts are being made in New South Wales to extend the cultivation of the best kinds of citrus fruit (oranges and lemons), in the hope of developing an export trade to England and America.

A sample shipment of fruit was despatched from Sydney to London about a year ago. The Washington Navel oranges realized very satisfactory prices, ranging from 7*s.* 6*d.* to 16*s.* 6*d.* per case, the greater number bringing from 12*s.* to 16*s.* 6*d.* Oranges of the Jaffa, Mandarin, and other varieties commanded correspondingly lower prices, while the lemons realized only 3*s.* to 5*s.* 3*d.*

It is believed that the Washington Navel orange will do well in the colony and return a handsome profit, more especially if the soil is well worked and manured. Growers in many cases are cutting back trees of the Seville and other varieties, and grafting with the Washington Navel. The Jaffa is another profitable variety. Valencia Late is also grown, but owing to lateness in ripening is hardly sweet enough for export to Europe in June or July. It would, however, be in proper condition to ship to America in August, September, and October, when such fruit usually commands a good price.

The report on the trial shipment mentioned states that if the cost of packing, marketing, and shipping in cool storage to England could be reduced to about 4*s.* 6*d.* to 5*s.* per case, the results would be sufficiently profitable to encourage the trade. The brokers in London recommended that only the best selected fruit should be sent, and that the oranges be packed separately in silky or oily paper, instead of in common white paper. In the case of one or two of the oranges decaying, the use of the former kind of paper prevents the decay spreading to other fruits.

VALUE OF THE GROUND NUT.

The value of the ground nut, not only for the remunerative fruit crop yielded, but also on account of the special qualities of the vines for the purposes of green manure, has frequently been dwelt upon in the *Agricultural News*. This crop is very popular in the United States (where it is known as the peanut), and the area under cultivation appears to be annually extending. From a booklet 'The Peanut and its Culture,' issued by the American Nut Journal Company, Petersburg, Virginia, the accompanying notes have been taken:—

The opinion has been entertained in some quarters that the ground nut is an exhausting crop. This is an error. It is only so when the method of cultivation adopted involves taking the entire crop, plant and fruit, off the land without putting anything back to replace the elements of fertility that have been abstracted. The crop does not draw heavily upon the fertility of the soil. The plant is a nitrogen collector, and having a strong tap-root that penetrates deeply into the subsoil, it collects much of its mineral food from the layer of earth beneath the surface soil. It does not get the bulk of its food material from the surface through a great mass of fibrous roots, as is the case with corn.

Like clover, and other leguminous plants having bacteria nodules upon the roots, the ground nut plant is a greedy collector of nitrogen from the atmosphere, either above or within the soil, and hence may be utilized, like clover, in restoring fertility to the soil. The root of this plant, in shape and mode of growth, resembles the branching of an oak tree, with a main root or stem that penetrates deeply. Hence the plant is a good drought resister. It does not send out lateral roots far into the surface soil, like Indian corn, hence fertilizers are best placed under the plant in the row, rather than broadcast.

Ground nuts are of special value for growth as green manure. Pound for pound, rotted, the vines are fully equal in value as a fertilizer to the best stable manure. Wherever ground nuts are picked off in the field, and the vines and debris are left to decay, the corn or other crop grown upon the spot in the following year will invariably show great improvement.

The domestic uses of the crop are very important if properly utilized. As a feed and fattener of stock and poultry, ground nuts are worth more, acre for acre, than field peas or corn. They not only yield more food and more fattening material to the animals, but the benefit to the soil arising from the decay of the vines and roots is greater. Wherever pigs, turkeys, ducks, geese or hens are raised and fattened for the market, this crop should be grown for consumption upon the land. There is no better fattening agent. When the crop is fed at home all the labour and cost of harvesting and selling the crop is obviated, and the farmer gets more per pound for the nuts thus converted into meat, than he could get for them after the most careful harvesting and marketing. Further, by this means manure of high fertilizing value is economically produced.

In regard to feeding value, ground nut kernels have an average of 29 per cent. protein, 49 per cent. fat, and 14 per cent. carbohydrates in the dry material. Not only is the kernel part high in feeding value, but the vines also are very nutritious as a stock food. A loamy soil of a sandy nature, that is light and porous, produces the most remunerative crop. However, practically any kind of soil that is open and friable and that can be kept so, provided there is lime and mineral elements, will do for the plant.

The yield of ground nuts per acre varies from 25 bushels to 100, and occasionally as high as 150 bushels. The highest yield recorded by the Arkansas station is 143·6 bushels. This yield was secured from the Spanish variety, and on highly fertile soil. The highest yields secured at Fayetteville were obtained in 1902, when the Virginia White yielded 113·6 bushels per acre, and Spanish yielded 109·9 bushels per acre, on soil of only ordinary fertility, and without fertilization other than the ploughing-under of the stubble from a heavy crop of cow peas. This soil was a mixture of calcareous and siliceous formations, admirably suited to the requirements of the ground nut plants.

CABBAGE GROWING IN ST LUCIA.

For some years past cabbage growing has been carried on, on an experimental scale, at the Botanic Station, St. Lucia, and now it is reported that the cultivation of the crop is being undertaken by several growers in the island. This vegetable should certainly find a ready market, and provided the right varieties are tried, success would probably attend efforts made to extend cabbage cultivation in other islands of the West Indies.

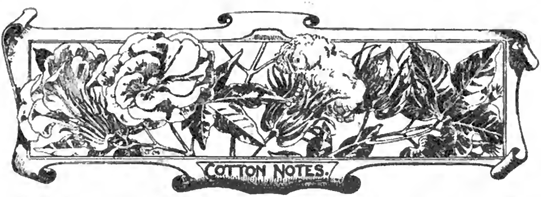
The report, for 1906-7, on the Botatic Station, St. Lucia, gives the following particulars in reference to the cabbage experiments:—

This year, the cabbage plot occupied ⅛ acre. The land received manure at the rate of about 16 tons per acre. The plants were put out on December 21, and the cutting of the crop lasted from the middle of February to late in April. The crop consisted of about 1,200 heads, averaging in weight 3·4 lb. each. The varieties grown were 'Succession' and 'Autumn King,' and they have now been tested at the station for six years in succession, and have always given satisfactory results.

The land for cabbages should be heavily manured and forked early in November, and about the same time the seed should be sown in boxes or seed-beds. When the seedlings have formed three leaves they may be transplanted into other beds of rich soil, and by the first week in December they should be strong enough to be planted out in the field. With favourable weather and good tillage, the 'Succession' should be fit for cutting in about twelve weeks from sowing, and the 'Autumn King,' from two to three weeks later.

The distribution of seeds of these varieties from the Botanic Station, practically at cost price, and the sale of produce from the Experiment Station, have done much to make this vegetable popular. Supplies of well-grown cabbages are now frequently to be seen in the local market in season, whereas a few years ago stumps carrying a few loose leaves represented this vegetable, and imported supplies were retailed at 4*d.* per lb.

Para Rubber Seed. Para rubber seeds, direct from the East, can be obtained on order from Mr. C. Curtis, Laurel House, Barnstaple, England, and formerly Superintendent of the Government Forests, Penang. Orders should be sent by the end of July in time for the autumn crop, which ripens from September to November. For less than 1,000 seeds the price is 8*s.* per 100; over 1,000 but less than 5,000, £3 per 1,000; over 5,000 but less than 20,000, £2 15*s.* per 1,000; over 20,000, £2 10*s.* per 1,000.


COTTON NOTES.

COTTON SEED SELECTION AT BARBADOS.

In December 1905, it was decided to carry out experiments with the object of improving the cotton grown in Barbados by seed selection as outlined in the *West Indian Bulletin*, Vol. IV, p. 208, and arrangements were made for the work of selection to be carried out on seven estates. From one of these estates—Stirling—fifteen plants were obtained, and from these fifteen three plants were finally selected, viz., Nos. 300, 301, and 303 (*West Indian Bulletin*, Vol. VII, p. 159).

Recently Dr. C. E. Gooding, the proprietor, shipped, under the mark 'Stirling S,' 7 bales of cotton from plants grown from the seed obtained from the plant No. 303, and Messrs. Wolstenholme & Holland, in reporting on this cotton, write :—

> We have formed a very high opinion of this latter lot ('Stirling S'), as it is the most serviceable class of cotton we have seen produced in the West Indies, and if it gives a better yield per acre than the finer descriptions—as it probably will—we think it is more suitable for extensive cultivation.

This cotton, as Messrs. Wolstenholme & Holland correctly surmise, has for the last four plantings given heavier yields in the experiment fields at Stirling than any of the other varieties grown.

The opinion expressed by Messrs. Wolstenholme & Holland is very encouraging, and shows the desirability of systematically and regularly carrying out the selection of the best seed for planting purposes.

COTTON IN THE SEA ISLANDS.

Messrs. Henry W. Frost & Co., of Charleston, report that the condition of the Sea Island cotton market remains very dull. Prices are still the same as those quoted in the last issue of the *Agricultural News*, and during the fortnight ended April 11 last it is stated that no receipts, sales, or exports had taken place.

Messrs. Frost's report of April 11 contains the following note on planting prospects for the coming season :—

> The spring so far has been an early and favourable one, and the cotton crop has been planted in the Sea Islands, as well as in Georgia and Florida. With fair weather conditions, it promises to have an early and fair start.
>
> On the islands and coast of Carolina, the acreage is reported about the same as last year. In Georgia, however, there has been a sharp reduction in the acreage, owing to the low prices prevailing. In Florida it is also reported that there has been a decrease in the acreage, but not to as great an extent as in Georgia.
>
> Owing to low prices prevailing, the receipts are now very moderate, and it is reported that if no improvement in the market takes place, at least 10,000 bales of the crop will not come to market, but will be held over until next season, when with reduced acreage, and probably some improvement in trade, it is hoped that better prices may be realized.

WEST INDIAN COTTON ON THE LIVERPOOL MARKET.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of April 13, in reference to the sales of West Indian Sea Island cotton :—

> Since our last report about 400 bales West Indian Sea Island cotton have been sold, comprising Anguilla, Antigua, Barbados, Montserrat, St. Kitt's, Nevis, and St. Vincent, chiefly at 15*d.* to 16*d.*, with a few bales very choice cotton at 17*d.* to 19*d.*

COTTON GROWING IN JAMAICA.

A number of hints and recommendations to cotton growers are given in the March number of the *Journal* of the Jamaica Agricultural Society.

> The middle of August is mentioned as the most suitable time for planting in Jamaica, since this would ensure a dry season (January and February) for reaping. If a good stand is ensured before the October rains, the plants do not get strangled by weeds, and the cost of weeding is much reduced.
>
> The time of the first rains of March is recommended as most suitable for spring sowing. Planting should not be continued after April, and by following this rule the greater portion of the spring-sown crop will be gathered before the September rains.
>
> Attention is drawn to the need of a thorough knowledge (on the part of Agricultural Instructors and also of planters) of the contents of the *A. B. C. of Cotton Planting*, published by the Imperial Department of Agriculture, since this booklet contains full information and advice on all points connected with Sea Island cotton cultivation.
>
> The Agricultural Instructors, it is urged, should endeavour to interest in cotton planting at least one intelligent planter in every locality, and should use trial plots planted by such men as centres for demonstration to neighbouring holders.

ATMOSPHERIC NITROGEN AND ITS FIXATION BY ELECTRICAL METHODS.

The question of how to provide a continuous and available supply of nitrogen to growing crops at the least cost is discussed in an article, 'The Present Status of the Nitrogen Problem,' that appears in the latest issue (1906) of the *Yearbook* of the United States Department of Agriculture. The writer concludes that in the case of the greater proportion of the available land of the world this question will become a problem of bacteriology, with the soil as a culture medium. But while much can be accomplished through the agency of soil bacteria in conserving and increasing the supply of combined nitrogen, it is obvious that there will always be a demand for an immediately available supply of nitrates, or other form in which nitrogen can be supplied for the use of growing crops. Since the Chile deposits of nitrate of soda, which for years past have formed the chief source of supply of this valuable nitrogenous manure, must sooner or later be exhausted, it is satisfactory to note that considerable progress has been made of late years in electrical processes designed to effect the fixation of atmospheric nitrogen in a suitable form, so as to make it available for manurial purposes. The following mention of these processes is made in the article in question:—

It has long been known that atmospheric nitrogen can be oxidized under the influence of electricity, producing nitric oxide fumes, which are then combined with water, to form nitric acid, or with quicklime, forming calcium nitrate. Other bases may also be used. Various attempts have been made from time to time to develop a process by which nitrogen can be combined commercially. The most promising results have thus far been secured with Franck's process of making calcium cyanamide and with the Birkland and Eyde process of producing nitrates. The former process consists in combining nitrogen with the carbides of alkalis, producing cyanides, or, in the case of calcium, producing calcium cyanamide, containing 35 per cent. of nitrogen—more than twice the amount present in nitrate of soda. The calcium cyanamide, when properly used, has proved to be an excellent nitrogenous fertilizer for many crops, and quite equal to ammonia compounds, into which it can be readily converted. The ammonia thus produced can be oxidized by conducting it over highly heated metallic oxides, producing nitric acid.

The Birkland and Eyde process, however, appears to be the most promising as a means of producing nitrates. A special electric furnace is used, in which an alternating electric arc of between 3,000 and 4,000 volts, is produced in connexion with a large electro-magnet, which forces it to take the form of a roaring disc of flame. Air is forced through this furnace at the rate of about 3,000 cubic feet per minute, the nitrogen being oxidized in the furnace to nitric oxide. These fumes are then collected, and after further oxidation are absorbed in water towers, forming nitric acid, or by powdered quicklime, forming calcium nitrate. Of course, the nitric acid can be combined with almost any desirable base, such as soda or potash.

These direct processes of securing nitrogen will certainly be rapidly improved, and what has been accomplished already in this direction should remove the last vestige of doubt that we shall be able to secure at a reasonable cost all of the immediately available nitrogen we may need, in addition to the great supply that may be secured through bacterial action.

POTASH AS A PLANT FOOD.

The following notes on the importance of potassium as a plant food are taken from an article, 'The Relation of Nutrition to the Health of Plants,' which appeared in the *Yearbook* of the United States Department of Agriculture for 1901:—

Potassium, the essential ingredient of potash, is well known to be one of the most important and indispensable of all plant foods. Large quantities of it are required by all crops. A considerable part of the ash of most plants consists of this material, and though closely related to sodium in its chemical properties, the latter cannot replace it in the plant. Plants growing in soil which contains more sodium than potassium will nevertheless absorb much more of the potash. One of the first signs of a lack of potash is a decided cessation in growth without other apparent cause of trouble. The plants often have their normal green colour, but make very little starch or sugar, and almost no protein or nitrogenous matter. Potash plays an important part in the formation of starches and sugars, but its greatest importance is in connexion with protein formation, in which it is apparently indispensable. When it is remembered that proteins or the related nitrogenous compounds are the main source of food for the young growing cells, the importance of potassium will be appreciated.

A ready supply of potassium also hastens and perfects the maturing of plants, especially the ripening of the wood of fruit and other trees. A lack of potash is said by Webber to cause in the orange an excessive growth of weak, immature wood. The same writer also calls attention to the fact that many growers believe that potash, at least in the form of sulphate, causes the production of excessively sour fruit. It would be important to determine if this is really true. There are good physiological reasons which lead us to expect such a result, not only in the orange, but in plants in general. However, an increase of starch or sugar would also be expected at the same time. The acid juices of plants are, as a rule, disliked by insects and fungi. This may explain why muriate of potash prevents, to some extent, the ravages of the rust mite on the orange, and the injurious action of the rust mite on cotton.

Clay soils, especially clay loams, usually contain from 0·5 to 0·8 per cent. of potash, lighter loams about 0·3 per cent., and deep sandy soils less than 0·1 per cent.; but even this small amount is equivalent to 3,500 lb. to the acre, assuming that an acre of land 1 foot deep weighs 3,500,000 lb. As a rule, therefore, it is only upon the lighter sandy soils that a lack of potash may be expected. In the use of potassic fertilizers careful attention should be given to their composition. Muriate, or chloride of potash, and the sulphate are examples of common potash fertilizers in use. The former is as a rule cheaper, and, for some crops, just as good as the sulphate, and should therefore in these cases be used. The sulphate is preferable for certain crops, and when doubt exists, is much safer and more satisfactory. This is especially true in the case of tobacco, which requires a proportion in the leaf of about 6 parts of potash to 1 part of chlorine to be of good burning quality. Night soil, kainit, and other manures rich in chlorine should not be used for tobacco.

Wood ashes contain a great deal of potash, but practically the whole amount used for manurial purposes is obtained from the mines at Stassfurt, Germany, which appear to be almost inexhaustible. The price of this fertilizing constituent has remained practically constant during the past fifty years.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

In the editorial of the present issue, some information is given in relation to those blood-sucking flies which are responsible for the conveyance of various tropical diseases. This is a subject which is engaging a great deal of attention at the present time.

Particulars in regard to the trade in, and consumption of sugar in the United States will be found on page 130. Notes on the following page discuss the shortage in the Cuban sugar crop, and the result of experiments in stripping sugar-cane, carried out in Hawaii.

The question is being raised as to the possibility of developing an export trade in bananas from India to England. Experimental shipments of citrus fruits from New South Wales to London have given promising results (page 132).

The great value of seed selection work in cotton growing is evident from the brief article 'Cotton Seed Selection at Barbados' on page 134. Other notes on the same page refer to cotton growing in Jamaica, and the present state of the cotton market.

Interesting methods now coming into practice, of obtaining nitrogen from the atmosphere, are described on page 135, where also appears a brief article dealing with the importance of potash as a plant food.

On page 141 will be found an address recently delivered in Antigua by Dr. Francis Watts on the subject of Agricultural Instruction in Elementary Schools.

Department Publications.

The index and title-page for binding Volume VI of the *Agricultural News* are issued as a supplement to the present number.

Reports, for the year 1906-7, of seven of the Botanic Stations of the West Indies are now on sale by all the Agents of the Department. In the cases of Grenada, St. Vincent, St. Lucia, Dominica and St. Kitt's, the price of the reports is 6*d.* each number. The reports on Montserrat and the Virgin Islands, respectively, are issued at 3*d.* each. As already mentioned in reviews which have appeared in the *Agricultural News*, the above reports are exceptionally full, and contain a good deal of interesting matter. They are, in each case, prefaced by a history of the particular Botanic Station, and are well illustrated by reproduction of photographs.

Preservation of Green Colour in Plants.

The preservation of plants so as to maintain their natural green colour has been successfully carried out by Professor Trail, of Aberdeen University, who describes in the *Kew Bulletin* (No. 2, 1908) the method followed by him.

The plants to be preserved are steeped for a time in a solution of copper acetate in acetic acid, whereby compounds of chlorophyll with copper are formed. On removal from this solution, they are washed in fresh water, dried in the air, or transferred to a preservative fluid.

The best results were obtained when the plants were boiled for a short time in the solution. The average time required in the boiling process is about five minutes, the most refractory plants requirng no more than twenty minutes. The green colour so fixed is quite permanent and almost natural.

Cattle Trade of British Guiana.

The cattle breeding and export industry of British Guiana has developed within the past nineteen years. In 1887-8 the imports of cattle into the colony numbered 1,223 head, while only forty-eight were exported. The imposition, in the following year, of a duty of $10 per head of cattle imported appears to have stimulated the development of a local breeding industry, with the result that during the ten years 1890-1900, the exports of cattle from British Guiana continually tended to equal or exceed the imports. Last year the exports reached 1,389 while the imports were reduced to one solitary head.

The Government of British Guiana has received a communication from a firm of Brazilian merchants, suggesting the possibility that an export trade in cattle might be developed between the colony and Brazil, and stating that arrangements might be made whereby a large number of animals could regularly be taken, if terms were agreed upon. The matter is now under consideration by the Royal Agricultural Society of the colony. The poor transport facilities available for conveying the cattle are likely to prove the chief difficulty in the way of developing a profitable industry in this manner.

Para Rubber Seed Oil.

Para rubber seed is now in great demand for planting purposes, and for the present there is no need to consider other methods of utilization, but it may be well to point out that the seeds possess a commercial value on account of their oil content, and when the supply exceeds the demand of planters, a market will still be available.

The oil of the seed of *Hevea brasiliensis* is similar in character to linseed oil, and is quite equal in value to the latter for the preparation of paints, varnishes, etc.

The *Agricultural Bulletin* of the Malay States (November 1907) reports that offers have been received from manufacturers and others for decorticated Para seed in good condition at from £10 to £12 per ton.

The shell of the seed, which has no commercial value, should be removed before shipping, in order to reduce the cost of freight.

Indigo Production in India.

As is generally known, the indigo acreage in India has tended to fall off of late years, as the result of the competition of the synthetic product. While the average indigo acreage for the five years preceding 1904-5 was 755,900, the area planted in 1906-7 had decreased to 329,800 acres.

It is now believed, however, that the lowest possible point has been reached in the cost of producing synthetic indigo, and the Consul-General of the United States at Calcutta reports that many growers are strongly of opinion that, with new methods of cultivation and more economical processes of extraction, which are claimed to have been recently discovered in India, natural indigo can be produced more cheaply than the synthetic article.

A proof of their convictions in regard to this point lies in the fact that in the United Provinces, 47,319 acres were planted to indigo in 1907, an increase of 6,935 acres as compared with the previous year.

Nitrate of Soda Output in South America.

Reports from Valparaiso place the total output of nitrates from the deposits of Chile and Peru, during the period from 1830 to 1907, at 36,443,327 tons, valued at £231,818,492. As much as 40 per cent. of this total was produced during the last ten years. At present the output approximates to nearly 2,000,000 tons per annum. These beds of nitrates are very remunerative to those working them, and it is stated that half the price obtained is net profit. A new process has lately been introduced which will diminish the proportion of nitrates left in the waste from about 10 per cent. to as little as 2 per cent.

The time which must elapse before these beds will be exhausted has been variously estimated. It is stated by some that the supply, even at twice the present output, will last another two hundred years, while others are of opinion that the beds will give out in another fifty years or less.

Botany of Bahamas and Caicos Islands.

A report on a botanical exploration of the Bahamas and Caicos Islands, lately made by two members of the staff of the New York Botanic Gardens, is given in the *Journal* of the Gardens for March last.

The total number of herbarium specimens collected in this visit were about 8,000. The marine algae are mentioned as being of special interest. Among the interesting plants found at Watling's Island were *Euphorbia vaginulata*, Griseb. (which occurs there in great quantity, though formerly known only from Turks Island), and some marine algae of rare occurrence, including *Halimeda tridens*, previously reported only from Porto Rico. Several species of plants which it is believed are new to science, were discovered at Atwood Cay, an uninhabited island, visited only by gatherers of cascarilla bark (from *Croton Eleuteria*). Seven hundred specimens of plants were collected at Mariguana, an island notable as the resort of many interesting birds. Large flocks of the red flamingo were seen there. A specimen of the lignum-vitae (*Guaiacum officinale*) was obtained on South Caicos Island.

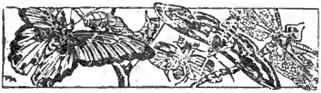
North Caicos is mentioned as the most interesting of all the islands visited during the voyage, on account of the abundance and development of its vegetation. It is remarked that a more thorough exploration of what is known as the 'Kew' district of this island at some future time would undoubtedly yield results of much scientific value.

Propagation of Camphor.

Attention has of late years been given in Ceylon to the cultivation of camphor trees, as a result of the increasing price obtained for the product. On account of the difficulty experienced in getting a good supply of seed from Japan, however, experiments in vegetative methods of reproduction have been carried out at the Royal Botanic Gardens of the island.

The process of layering was tried with young branches of the camphor trees, and this was usually successful, although very slow. At a convenient point, just below a bud, the branch to be layered should be half cut through on the lower side, and split upwards for an inch or so. This portion should be inserted into the ground, and kept in position with a hooked peg.

The most successful of the methods tried was that of propagation by 'root cuttings.' Adventitious buds readily develop on the lateral roots of camphor trees, especially where the roots are a little exposed, these buds afterwards developing into suckers. Cuttings of roots, about the thickness of an ordinary lead pencil, and bearing adventitious buds were made and planted out. Over 50 per cent. of these cuttings struck root, and are reported as growing well. Such cuttings may be made anything from 2½ inches in length. The top cut should be made in a slanting direction just above a bud, the lower cut being horizontal and just below the bud. In placing the cutting in the soil, the uppermost portion must be the end which was nearest the stem of the parent tree.



INSECT NOTES.

The Hemiptera or True Bugs.

In the *Agricultural News* from time to time (see Vol. VI, pp. 106, 218, 266, 298) there have appeared short sketches dealing with groups of insects in which the general characters of the order or family have been given, and mention has been made of certain West Indian forms likely to be well known on account of their habits, or any peculiarity or special beauty in their appearance.

The Hemiptera include many diverse forms of many habits. The name of the order means half-wing and was given on account of the peculiar appearance of those members of the order who have the outer wings thickened for a portion of their length (say one-half) while the remainder, the terminal portion, is thin and membranous. The Hemiptera have sucking mouth parts, and undergo incomplete metamorphosis.

The Hemiptera are divided into three large groups. One of these contains insects which in their habits are parasitic on man and other mammals. These are low forms which have no wings, such as the lice and bed-bugs.

A second group is called the Hemiptera Homoptera, in which the outer wings are membranous for their whole length. To this group belong the scale insects (Coccidae), the white flies (Aleyrodidae), the lace bugs, the leaf hoppers, the plant lice (Aphidae), and others.

The third group contains the Hemiptera in which the wings are typical as described above; they are called Hemiptera Heteroptera.

Perhaps the most abundant and the most important from an agricultural point of view are the scale insects. Nearly everyone in the West Indies is familiar with these insects, or with the results of their work. Scale blight, as it is often called, attacks nearly every kind of plant growing in the tropics. The scale insects on the citrus fruits and on cotton are perhaps as well known as any.

In this family is found still a further exception to the wing arrangement. The female is wingless and the male has only one pair of wings.

The white flies (Aleyrodidae) are closely related to the scale insects. One species (*Aleyrodes citri*) is fairly common on citrus trees and, in Barbados at least, another species (*Aleyrodicus Cocois*) occurs on the cocoa-nut, and others on a variety of palms, banana, fiddlewood, and other plants.

The aphids or plant lice are also common and are at times serious pests. The cotton aphis, and the aphis of rose and many other garden plants are all well known.

Among the Hemiptera Heteroptera are to be included the cotton stainers (*Dysdercus* spp.), the green pea chink (*Nezara viridula*) which is common on pigeon peas and often found on cotton, the large brown bug (*Spartocera fusca*), which is sometimes found on tomato and other Solanaceous plants, the water striders, water boatmen, and others.

Although most of the members of this latter group are plant feeders, some are predaceous on other insects and a few even attack man. The most common of these latter is the blood-sucking cone-nose (*Conorhinus sanguisugus*) which inflicts a very painful sting with its proboscis. The wheel bug (*Arilus cristatus*) is one of the largest of the tree bugs. The thorax is much arched longitudinally in a sharp curved ridge which is toothed like a saw. This insect is predaceous and, in this way, useful.

There is an insect which is frequently found in cotton fields and mistaken for a cotton stainer and which is predaceous on other insects. Care should be taken by the cotton grower to distinguish between them.

As the Hemiptera are well provided with sucking mouth parts, Paris green and other similar stomach poisons are useless. Scale insects, plant lice, etc., must be killed by means of contact poisons, such as kerosene, whale oil soap, petroleum, rosin, etc. Directions for making up these solutions and applying them have been published from time to time in the *Agricultural News*, and are to be found in the booklets 'Scale Insects of the Lesser Antilles,' Parts I and II, Nos. 7 and 22 in the Pamphlet Series issued by the Imperial Department of Agriculture.

INCREASED USE OF ARTIFICIAL MANURES IN EGYPT.

The United States Consul-General at Cairo draws attention to the increasing imports of artificial manures into Egypt. While the quantity shipped to Egypt from South America in 1904 was only 20 tons, it increased in 1906 to 2,798 tons, valued at $136,500.

The Consul states that the above increase is due partly to the greater area of cultivable land, owing to the Assouan Dam and other irrigation works, and partly to the fact that the peasant cultivators are endeavouring to grow cotton once every two years instead of once in three, and are beginning to realize that it is necessary to restore to the soil the nourishment taken from it by the cotton.

The chemical manures used, with average prices per ton c. i. f., Alexandria, including the packing of the manures in double sacks, are as follows: Nitrate of soda, $60·88; sulphate of ammonia, $63·31 to $64·53; superphosphate, $15·10 to $16·07.

The only manures manufactured in Egypt are sewage and slaughter-house products worked up by the Cairo Sewage Transport Company, for which a good market is found. The market for chemical manures is open to any manufacturer or merchant, as there is no monopoly for the import of artificial fertilizers, and also because the Government has ceased lending money to the Khedivial Agricultural Society at a low rate of interest, i.e., 2 per cent. per annum.

The imports of chemical manures are allowed duty free into Egypt, and there are special reduced rates on the State railways for carriage into the interior.

Chile is the principal source for nitrate of soda; Belgium for superphosphates, and Glasgow is the main port of shipment for sulphate of ammonia.

Castilloa Rubber Seed. In view of a prospective demand for Castilloa rubber seed during the coming season, it may be mentioned that the Curator of the Dominica Botanic Station expects to have about 12 or 15 lb. of seed available after meeting the local demand. At Montserrat, the Curator anticipates that he will be able to supply about 10 lb. of seed from the Castilloa trees at the station. This rubber seed should be worth about 5*s*. per lb., packed.

THE JAMAICA EARTHQUAKE.

A further extract from Dr. Vaughan Cornish's paper, dealing with the character and results of the Jamaica earthquake, is given below, in continuation of the notes which appeared in the last issue of the *Agricultural News*, describing the personal experience of the author in Kingston at the time of the disaster :—

The economic importance of the Jamaica earthquake of January 14, 1907, is due to the destruction of Kingston and its suburbs, and it is in and around the city that the effects of seismic shock upon buildings can best be studied. Viewed, however, from the physical standpoint, the importance of an earthquake is independent of the neighbourhood of cities.

I think I shall be able to show that the Jamaica earthquake was essentially double-barrelled, so to speak ; that Kingston was brought down by one barrel, and that the other barrel was discharged in a thinly populated district, where it consequently did much less damage : but that when we examine the seismic effects in parts of the island distant from either of these foci, we find that they are, on the whole, about as much due to the one part of the double shock as to the other, the charge in the two barrels, so to speak, being about equal. From the physical standpoint, therefore, the Kingston earthquake is not quite the same thing as the Jamaica earthquake.

Thirty seconds is the duration currently assigned to the earthquake at Kingston, but no one really timed it there. At Kellits, about 35 miles north-west of Kingston, Mr. Horn informs me that the earthquake, timed with a watch, lasted 37 seconds, this space of time being divided as follows, viz : 17 seconds shaking, 13 seconds rolling, and again 7 seconds shaking, which finished with a distinct jerk. At Bethany, about 45 miles north-west of Kingston, Dr. Hargreaves informs me that he timed the earthquake by a seconds-hand watch, and found that it lasted 30 seconds.

I have described the character of the vibrations which I experienced in a top story corner room of a brick house in East Street. These were only in a secondary sense due to the earthquake, the immediate cause being the action of the vibration of the massive walls upon the wooden floor. The movement of the ground was well observed opposite the old Mico, in Hanover Street, by Sub-Inspector Tremlett, and near the south end of John's Lane by Mr. Sullivan. In addition to any jarring or bumping, there was a strong swell—literally a ground swell—running from west to east or east to west. Mr. Sullivan says the west-to-east roll was much stronger that the return roll from east to west. The impression generally received was that these surface undulations were only a few yards from crest to crest, and they certainly succeeded one another several times in a second. The height from crest to crest appeared to be several inches, so that their steepness was very considerable. As far as I am aware, the only instrumental evidence as to the periodic time of the earthquake oscillations is that afforded by the transmitter of the West India Direct Cable to Kingston. I learnt that it had continued to run for a time before the office collapsed, and that the strip of paper had been sent to the London office as a curiosity. I therefore timed the running of the machine in Kingston, and afterwards in London was allowed to measure the oscillations of the writing pen as recorded on the strip of paper. There were ten complete north-south-north oscillations in the first two and a half seconds, i.e., four per second. The position of the instrument did not permit it to record east-and-west vibrations.

I carefully examined a large number of buildings in Kingston, which is a brick town, to ascertain the line, or direction, and the sense in which walls had fallen. The town is laid out rectangularly, houses facing the four cardinal points, and in the detached houses east- and west-facing, outer walls generally fell, while this fall of north- and south-facing walls was an exception except in the area of greatest damage. Of the east- and west-facing walls many more fell to the east than to the west. In the neighbourhood of North Street, east of East Street, which I examined in detail, I found that of the north- and south-facing walls more fell to the south than to the north. Thus the walls tended to fall, in most cases, towards a little south of east, but in some cases, a little north of west.

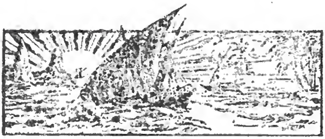
I consider that the fall of these walls was due to the action of the surface waves above described in tilting the walls out of the perpendicular, first in one direction and then in the other, causing them to sway. If the waves were short, as they appeared to be, and as I think they were, the lower part of the wall was thrown very much out of plumb at each half-swing, and a wave of displacement travelled up each wall, so that it became sinuous in form and was subjected to rippling movement.

The more rapid jarring vibration, which was so marked a feature of the sensations of the earthquake, probably had little effect in overthrowing walls. The north- and south-facing walls, which did not usually fall, were equally exposed to this form of vibration, which seemed to come somewhat steeply from below. These walls were rocked longitudinally by the east-to-west or west-to-east waves (instead of swaying transversely), and the effect was to produce a double system of cracks, often going through the whole thickness of the wall but not throwing it out of plumb. As the wall returned westward from its eastward excursion, a crack formed, owing to the want of tensile strength in brickwork or masonry, the eastern end of the wall being, so to speak, left behind. On the return vibration in an eastward direction, a corresponding crack opened at the west end, and these cracks often cross each other diagonally, as some of my photographs show. Walls in which cement mortar had been used stood much better than those with only lime-mortar. Kingston lime-mortar is generally of poor quality. The defect of all stone and brickwork, however, in respect to earthquake shock, is want of tensile strength, hence the advantage of reinforcing concrete, etc., by strips of metal, which give a fibre to materials otherwise two brittle. The disadvantage of extra height and top weight were, of course, abundantly in evidence. Any departure from simplicity of form usually brought about additional damage, Gothic gable and classic cornice being almost equally unsuitable in earthquake countries. In face of these restrictions it seems that architects in earthquake countries must rely mainly upon the skilful proportioning of spaces for the production of artistic effect.

CANADIAN EXHIBITIONS. 1908.

The Imperial Commissioner of Agriculture has received the following letter from Messrs. Pickford and Black, in reference to the dates of the Canadian Exhibitions to be held in 1908 :—

We yesterday received your cable asking for dates of Toronto and Halifax Exhibitions and confirm our reply this morning. The Toronto Exhibition opens on August 29 and closes on September 14 ; the Halifax Exhibition opens on September 2, and closes on September 10 ; therefore it will not be possible for the exhibit that goes to Toronto to be exhibited at Halifax. We will then probably only exhibit at Toronto, unless the West Indies send two sets of samples.



GLEANINGS.

Cane fires have been very frequent in Barbados during the present reaping season. The majority are believed to be due to incendiarism.

The number of beet sugar factories worked in Germany in 1905-6 was 376; in the following year, 369, while in 1907-8, the number has fallen to 365. The output of sugar shows a corresponding decline.

The Martinique central factory is purchasing canes during the present season on a basis of 6 per cent. sugar content, this being equal to a price of $3·36 per metric ton (2,200 lb.).

Exports of sugar from Java to India have rapidly increased of late. For the eight months ending November 30 last, the quantity was 224,700 tons, as against 134,500 tons during the corresponding period of 1906.

A central sugar factory of large capacity (the first of its kind to be established in Jamaica) was opened at Vere on March 27 last by the Governor. A portion of the capital was subscribed in Great Britain, the remainder being local.

Mr. R. H. Biffen, M.A., well known for his successful work in connexion with the hybridization of wheat and barley, has been appointed to the professorship of agricultural botany lately established in the University of Cambridge.

Under ordinary circumstances, it is estimated that in 1908-9 the cultivated fruit lands of Porto Rico should yield crops of 156,700 boxes of citrus fruits, and 170,000 crates of pine-apples. (*Cuba Review.*)

Camphor trees in Japan are stated to bear their first crop of seeds when from twenty to twenty-five years old. Trees twenty-five years of age, in Ceylon, however, have not yet flowered. Camphor seeds do not retain their vitality for more than five months.

The Jamaica press reports a depressed condition of the banana trade of the island consequent upon the severe drought which has prevailed since early in 1907. As a result, the output has largely fallen off, but hopes are entertained that conditions will improve in May or June.

An experimental planting of Central American rubber trees (*Castilloa elastica*) was made at the Botanic Station, St. Vincent, in 1906-7. The plants are stated to be making strong, healthy growth. Two or three planters in the island are also giving this tree a trial.

Mr. T. C. Davenport, Bramhall Estate, Dominica, desires it to be mentioned that he has 5,000 budded Washington Navel orange plants ready for sale. For export the price is one shilling per plant, freight and packing extra for small lots. For orders of fifty plants and over, there will be no charges for freight and packing.

The best method of disposal of the cotton seed produced in the island is at present a subject of discussion in St. Croix, since the Barbados cotton factory is not taking the supply as in former years. Some growers are grinding the seed, using a portion for stock food, and returning the remainder to the soil as fertilizing matter (*St. Croix Avis*).

In St. Croix the sugar crop of the season began in the first week of April at two factories and on several muscovado estates. In the case of the central factory, however, the *St. Croix Avis* (of April 4) anticipated that work would not begin till about the third week in April. The crop is a very light one.

The new cotton factory at Blakes' estate, Montserrat, was lately opened, and is now ready to handle all cotton sent in. The building has two floors, on the upper of which two Asa Lee gins are worked. Should the result of the present season's working justify the step, two additional gins will be provided for next season. (*Montserrat Herald.*)

The cost of cultivating 33⅓ acres of land, under bananas in Cuba, for five years, is estimated by the Agricultural Department of the island to be $4,894. This land, it is stated, should produce 37,000 bunches of bananas, worth, on an average, 31c. per bunch, delivered at the steamer, which would give a gross return of $11,470.

The 1906 *Yearbook* of the U. S. Department of Agriculture states that there is an increasing demand for avocado pears in the United States, especially during the months from October to March. Florida growers are extending their plantings of late ripening kinds of avocado, and there is every prospect that the cultivation will give profitable returns. This fruit is also grown in California.

About eighteen months ago the site for a new Botanic Station in British Honduras was selected, and the work of clearing and laying-out was at once started. The area of the new station is about 20 acres, and it is conveniently situated near to Belize. The Government of the colony has now decided that the station shall be a permanent one, and lately voted the sum of $2,980 for its upkeep during the present year. A further sum of $1,400 was also voted for building quarters for the Superintendent.

Investigations made at the Rothamsted Experiment Station, England, on the subject of green colour in foliage plants show that the chlorophyll formation in plants has a close connexion with the amount of nitrogen assimilated, but that the carbon assimilation is not in proportion to the chlorophyll formed. Further, the necessity of a supply of potash in the soil in order that carbon assimilation may take place, was demonstrated by these experiments. No starch was formed in the grains of chlorophyll without the aid of potash.

AGRICULTURAL INSTRUCTION IN ELEMENTARY SCHOOLS.

The following is the substance of a speech given by Dr. Francis Watts, C.M.G., F.I.C., at a recent meeting held in the Bishop's School Room at Antigua. The speech, which is taken from *The Antigua Churchman* of April 1908, followed, and was based on a discussion which took place concerning the conditions and difficulties of agricultural teaching in the elementary schools of the presidency:—

At the outset of his speech, Dr. Watts remarked that it appeared to him that a great deal of difficulty arose from too much stress being laid on agriculture, and too little upon teaching. What one wanted was to teach general principles which would appeal to and broaden the minds of children, and not merely to draw attention to the drudgery of agricultural operations. One wanted children to be in a position to appreciate the fundamental facts underlying the growth and development of the crops amongst which they worked and on which they lived, and to know something of the soil, the plants, the animals, and other tangible objects by which they were surrounded.

The garden therefore should become the teacher's laboratory in which he can permit children to elucidate facts for themselves—facts which must have an educational even more than an agricultural bearing. In these gardens, children may conduct small experiments, and may acquire useful information about the best kinds of vegetables, food crops, and the like.

Dealing with the subject of school gardens, and the interest created in the minds of the children by successful crop growing on these plots, Dr. Watts referred to the successful manner in which cotton had been grown as an object-lesson at St. George's School, Nevis. This cotton had been cultivated and reaped in a systematic manner, samples had been exhibited at the Agricultural Show, and had gained a second prize in open competition. This small crop had been baled, shipped to the British Cotton Growers' Association, and the proceeds returned, the enterprise throughout constituting an object-lesson of the greatest utility.

The excellent exhibits which had been made at the Antigua Agricultural Show were also mentioned. There were good displays of vegetables which had been well grown, well prepared, and tastefully arranged. In addition to vegetables, there were good exhibits of decorative and other plants grown in pots. The preparation and ownership of such things as these must exercise a profound influence on the mind of the scholar.

From the school gardens, it was pointed out, information can be diffused amongst the parents who will thus learn to take an interest in the school work, while at the same time gaining indirectly useful items of knowledge from the lessons taught in the school. As a result some improvement might take place in the gardens of the peasants, and perhaps even the day's work of the labourer might be brightened and stimulated as the outcome of some thought carried home by his child from the school. The objection of parents to children working in school gardens has in most instances disappeared, and, as indicated above, it has actually been found that parents are quite capable of taking a strong interest in the work carried on by their children, once they recognize that there is no attempt to exploit the children's labours either for the benefit of the school or of the teacher, but that the object of the work is the instruction and benefit of the children themselves. A ready means of aiding the removal of this objection lies in the possession, by the children, of the crops which they themselves have grown. Where at present this objection is apparent, it may be well for the time to dispense with the garden, and to carry on the work in boxes and pots.

Dr. Watts said that, in his own experience with teachers, whenever he had come in contact with them he had invariably found that they could soon be worked up to a pitch of enthusiasm. He alluded in detail to his experience with the teachers at Dominica, who after offering some slight difficulties in the first course, became during the second, zealous and keen, so that it was quite easy eventually to carry out a very useful course of practical garden work. His experience with teachers in Antigua and in St. Kitt's-Nevis had been precisely similar.

The speaker appreciated the difficulties in garden work —difficulties which often were made greater by placing too much stress on school gardens, and too little on the general teaching of scientific principles. The work should proceed gradually, and school gardens only be resorted to when both teacher and scholar feel the need for carrying into operation the principles which have been brought to their notice in their lessons. A point is soon arrived at when both teacher and scholar are unable to rest satisfied with mere descriptions, when they want to handle the things themselves, and to put to proof the statements found in books. In this way practical work, first of all in boxes and pots, and finally in school gardens, will be felt to be necessary by both teacher and taught, and the lesson will be both pleasant and permanent in its effects.

A point to be emphasized in connexion with school gardens is the necessity of a good fence, and in many instances it constitutes a good object-lesson to grow a hedge around the garden plot. Such hedges are to be seen at most of the experiment stations, and the Officers-in-charge are always willing to assist the teachers with advice in this connexion. Without a fence, the garden lacks educational value, for it is liable to be injured by trespassing people and animals, and also lacks that neatness which is so essential in educational matters.

An adequate water supply is also most desirable, for without this, interesting experiments may be lost through drought, and children may be greatly discouraged by the failure of their efforts.

Dr. Watts strongly advocated teaching in relation to agricultural objects, on the ground that it enabled the teachers to deal with tangible objects and incidents of everyday life, and the children to grasp and appreciate the real practical bearing of the facts brought before them. Such teaching stood in striking contrast to some of the more abstract teaching which necessarily occupied a place in all schools, and so it afforded valuable mental relief. It encouraged the children to think and to take a rational interest in things relating to their everyday life, and afforded an opportunity for starting trains of thought and education which would be continued long after the immediate school work had ceased. Such teaching might and should exercise a profound influence on the lives of scholars, and tend to make them better citizens.

DEPARTMENT NEWS.

The Imperial Commissioner of Agriculture returned to Barbados from St. Vincent by the R.M.S. 'Eden,' on April 21 last, and left again for an official visit to the Leeward Islands on the following day, by the C.L.S. 'Dahome.' Sir Daniel Morris is expected to return to Barbados by the R.M.S. 'Esk' on May 5.

PLANT FOOD IN THE SOIL.

The following notes dealing with available and unavailable plant food in the soil, and the dependence of plant life upon the soluble portion of the fertilizing constituents present, originally appeared in the *Gardeners' Chronicle*, and are of sufficient interest to warrant their reproduction herewith:—

Plants are composed of two classes of chemical substances, the organic or volatile compounds, which are destroyed by burning; and the inorganic, or fixed elements, which remain in the ash after burning. The importance of the inorganic or fixed elements to plant life rests in the fact that, no matter what sort of a soil is under cultivation, a healthy plant carries away about the same amount of these constituents which it obtains from the soil for the building up of its structure. At the same time, while the same species of plant when matured may yield to analysis very similar quantities of these elements, different species will show different results as to kind and quantity; and the more remote the natural affinity of the species to each other, the wider, as a rule, will be these differences.

Perfect plants cannot be produced, much less can fruits, on soils where one or more important constituent is absent. The most valuable materials are phosphoric acid, potash, nitrogen, and lime. Accordingly, where soils have been exhausted by the growth and carrying away of crops, to a point below that of remunerative cultivation, they may be restored to fertility by making a judicious return of the ash or mineral constituents along with the element nitrogen. This last-named, the nitrogen, belongs to the organic class of plant foods.

While it is true that some alluvial soils possess vast stores of plant food, both of nitrogenous and of mineral substances, so as to be regarded as practically inexhaustible, yet by constant cropping, without a suitable return in manure, they will in time become unproductive.

Now the greater part of the plant food constituents necessary to profitable crop cultivation are locked up in an inert condition, in which state for the most part, they remain until united with a solvent supplied as manure. For example, in one of the experimental plots of the late Sir John Lawes at Rothamsted, to which no manure whatever was applied for thirty-eight years, the soil at the end of that period was found, on analysis, to contain in the top 9 inches as much as 36,604 lb of potash per acre, and 2,503 lb. of phosphoric acid per acre. Of these very large amounts of plant food in the soil, only 91 lb. of potash, and 139 lb. of phosphoric acid per acre were in a soluble condition and available to plants. The addition of 3 cwt. of superphosphate per acre to this same soil, on an adjoining plot, increased the solubility of the plant food to 165 lb. of potash per acre, and to 1,170 lb. of phosphoric acid per acre.

Having by this means brought the inert mineral constituents into a condition of solubility, the addition of nitrogen in the form of ammonia-salts as manure to this same land raised the produce from 22 to 43 bushels of barley-grain per acre, and the straw from 11 cwt. to 21 cwt. per acre.

The plant grown in exhausted soil is therefore starving, with mineral elements everywhere in the soil, and organic elements everywhere in the atmosphere, and none available for use.

Thus the chief office of manure is to furnish assimilable food for the immediate use of growing crops, and to combine with and supplement the natural food supply existing in the soil. When it is said that certain constituents in the soil are lacking, it does not always mean that the soil does not contain them, but that it does not supply to the growing plants as much as they need. It is not so much, therefore, because soils have been worn out of plant food, but rather because the food is locked up in such combinations that the plant roots cannot get at and use it, that an artificial supply of soluble food in manure becomes necessary.

It is believed that the beneficial effects of commercial fertilizers are due as much to the timely supply as to the amount of nourishment they contain. This timely supply enables the plants to enlarge their root system, whereby they are able to secure more nourishment from the soil over and above that furnished by the fertilizers, than they could have secured without such supply. If this be so, it is seen that the use of concentrated manures in small quantities may not only largely increase the yield of crops, but may also serve to deplete the soil of some of its elements of plant food more rapidly than would the same kind of crop and treatment without their use.

PHYSICAL CONDITIONS OF SOILS.

The fact that the healthy and flourishing condition of plants is as much dependent upon suitable physical conditions of the soil as upon the provision of the elements of plant food is perhaps not always remembered by cultivators. And yet, if through want of drainage, neglect, etc., land is allowed to get into an unhealthy condition, this condition is soon reflected in the character of the herbage growing upon the soil.

Probably the chief danger resulting from unsuitable physical condition of land is poor drainage, with consequent excess of water, and lack of sufficient oxygen in the soil. Such a state results in the weakening, and it may be, even the death of the roots of plants growing in such soils. This particularly applies to crops growing in heavy clay soils, especially where there is an impervious subsoil. Such crops will often have many of their feeding roots killed by suffocation during extended wet periods. Roots that may just be forming while the soil is in a suitably moist condition are often killed in two or three days if the soil becomes saturated with water. The vitality of the whole plant is weakened, not only by the loss of its feeding roots, but by the development, under the unhealthy prevailing conditions, of injurious products in the cells of the roots that are not killed.

Again, plants growing where the surface soil is liable to become caked and packed are likely to suffer from want of oxygen for the roots. This perhaps applies especially to trees. Under such conditions the annual growth is retarded, and the plants lose vitality. Plants in this state readily become the prey of insect and fungus pests. Deep and careful cultivation is of course the remedy for such a condition, and the provision of some organic fertilizer, such as pen manure, not only provides plant food for new growth of the roots, but also lightens the physical nature of the soil. Lime is also useful for this latter purpose in the case of heavy clay soils.

To realize fully the importance of the physical condition of the soil to plant life growing upon it, it is only necessary to remember that the roots of all plants must have a supply of oxygen, without which development is impossible. If they do not get this supply they will die of suffocation. The plant will be poisoned by its own decomposition products, and will starve, or become the prey of parasitic enemies which it is too weak to resist.

RICE PRODUCTION IN UNITED STATES.

Extracts from a British *Consular Report*, describing the methods of cultivation adopted with the rice crop in the United States were given in the last issue of the *Agricultural News*. The following notes, from the same source, give particulars of methods practised in harvesting, threshing, cleaning, and polishing the grain, preparatory to placing it on the market:—

Rice is cut when the straw barely begins to colour, when the lower part of the head (about one-eighth) is still 'in the milk.' If cutting is delayed until the entire head is quite ripe, the quality is inferior and the quantity greatly reduced by the loss incurred by shelling out in handling.

It is cut 10 or 12 inches from the ground, leaving a high stubble on which the grain is laid to cure. In about twenty-four hours, when the grain is thoroughly dry, it is bound into sheaves, tied with straw and shocked, or stood upright in the sun to dry. As soon as possible, the sheaves are taken in carts and waggons to the threshing mill, one of which is placed on each plantation.

In harvesting, more or less seed falls to the ground, especially at places where sheaves have been stacked and along the driveway from the fields to the barnyards. The seed that is not destroyed by sprouting and burning remains in the ground and grows up with the following season's planting. The self-set plant produces red rice, so called because of the pink cuticle next to the kernel. The great objection to red rice is that it is so soft that it cannot be milled, and is, therefore, unsaleable. The grain scatters out readily, and, re-seeding the field, produces more and more of its kind. In some instances it has increased so rapidly, and taken so firm a hold of the ground that it has been necessary to leave whole fields idle for a year or more in order to free the ground from the intruder.

To eradicate red rice the field is flooded immediately after harvest. This sprouts the scattered grain. When it has grown up, the field is drained as dry as possible and then burned.

Threshing is done on nearly all plantations with a steam thresher. The machines are stationary and very large. Threshing mills are erected on canals or on the banks of streams, in order that boats may come to the mill and carry the produce to market. In the process of threshing the grain is thoroughly cleansed by fans and screens, which remove all the light and inferior grains, chaff, etc., from the marketable article. This is then carried by elevators into large bins, where it is stored. Great care is taken that the grain be thoroughly dry before threshing.

The rough rice or paddy, as it is taken to the mill, has two coverings—a thin, close cuticle, encased by a coarse, thick, stiff husk. Milling consists in removing these coverings. In the process 20 lb. of husks are taken from 100 lb. of paddy.

The grain is usually brought to mill in boats and taken from the boats by elevators. The first operation the paddy undergoes in the mill consists in recleaning, after which it passes between milling stones, distant from one another by about two-thirds of the length of the grain. These tear off the husks, and, as the product passes over screens and bellows, the chaff and grain are separated. The grain is now placed in mortars, wherein the cuticle is removed by pounding with pestles. When the cuticle is removed the contents of the mortar form an oily mixture of rice flour and chaff. This now passes over 'flour screens,' by means of which all flour is removed. The 'chaff fan' is then used, and the rice, delivered as clean grain, is run into cooling bins. In the preceding processes so much heat has been generated that cooling is necessary. For about nine hours the grain remains in the cooling bin, after which one more separation takes place. By means of 'brush screens' the large rice is separated from the smaller, and the little flour that has not yet been removed is brushed from the grain. The product is now ready for the final process—polishing.

The commercial article is always polished. This consists in giving the grain a glossy appearance, and makes much difference in the market value. The process that gives the gloss removes much of the most nutritious parts of the grain including nearly all of the fats and most of the flavour. The food value of rice flour is many times greater than the food value of the polished product. Polishing is effected by pieces of skins passing over the rice and by giving a thin, fine coat of paraffin. Within a cylinder of wire gauze revolves a cylinder of wood, around which sheep-skins are tacked, wool inside. This gives a soft surface, over which tanned skin, worked to a velvet-like softness is fastened. The grain, with a piece of paraffin, is put into the large cylinder. The cylinder revolves, and passing the soft surface over the grain gives the pearly lustre.

TIMBERS OF BRITISH HONDURAS.

The *Monthly Bulletin* of the International Bureau of the American Republics for December last contains some interesting notes on the British Honduras timber supply, from which the following particulars have been extracted:—

Cabinet woods are one of the principal export products of the republic. The best known are the mahogany and rosewood the former being called the king of the forest, because of its beauty and good condition generally. It grows very slowly, and perhaps is not fully developed until about 200 years old. Mahogany grows all over the republic, especially in the valleys of the rivers and the lowlands adjacent to the rivers which empty into the Bay of Honduras.

The cutting season commences in August of each year, since, in the opinion of experts, it is not advisable to fell or cut the trees from April to August. Generally the trees are cut at from 10 to 12 feet from the ground, and to this end a scaffold has to be prepared for the woodman. Owing to the dimensions of the trunks the latter are considered more valuable than the limbs of the tree, but the branches are preferred because of the beauty of their graining and the richness and variety of their stripes. After the trees are cut they are dragged along broad roads to the river into which they are thrown.

Trade in Honduras woods is developing considerably, and there is no doubt that its importance will increase as the supply of wood from the West Indies and the Peninsula of Yucatan decreases, and the demands of the markets of the world increase. In addition to mahogany, there are many varieties of tropical woods in Honduras, such as rosewood, which grows in abundance on the northern coast; lignum-vitae, or 'guanacaste,' which also grows in profusion in the valley of Ulua, on the bank of the rivers, and in Camaguay and other valleys of the republic. Among the dye-woods of Honduras are yellow wood, yellow sandal, Brazil wood, dragon blood, Nicaragua or logwood, and arnotto. There are also many rubber trees and medicinal plants, producing gum arabic, copaiba, liquid amber, copal, castor oil, ipecacuanha, and caoutchouc The wood most extensively used in the republic is resin pine, which deserves special mention, not only on account of its superior quality, but also because of its extraordinary abundance.

MARKET REPORTS.

London,—April 14, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., April 14, 1908; Messrs. E. A. de Pass & Co., April 3, 1908.

Arrowroot—2¼*d*. to 2⅜*d*.
Balata—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8 per lb.
Bees'-wax—Good quality, £7 12*s*. 6*d*. per cwt.
Cacao—Trinidad, 78/- to 80/- per cwt.; Grenada, 72/- to 80/- per cwt.
Coffee—Santos, 28*s*. 7½*d*.; Jamaica, 40*s*. 6*d*. to 60*s*. per cwt.
Copra—West Indian, £16 per ton.
Cotton—St. Vincent, 15*d*. to 16*d*.; Barbados, 17*d*. to 19*d*.; St. Kitt's, 16*d*. to 17½*d*.; Montserrat, 16*d*. to 16½*d*. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—4/6 to 5/- per box of 200.
  Pine-apples—St Michael, 2/3 to 4/6 each.
  Grape Fruit—14/- to 16/- per box.
  Oranges—Jamaica, 6/- to 7/- per box.
Fustic—£3 10*s*. to £4 10*s*. per ton.
Honey—20*s*. to 28*s*. 6*d*. per cwt.
Isinglass—West India lump, 1/9 to 1/11 per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £11 12*s*. 6*d*. per cask of 108 gallons; Distilled oil, 1/9 to 1/10 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Loowood—£3 10*s*. to £4 5*s*. per ton; roots, £2 10*s*. to £3 10*s*. per ton.
Mace—1/- to 1/10 per lb.
Nutmegs—68's to 69's, 7*d*. to 9*d*.; 75's, 6*d*. to 6½*d*.; 105's, 4¼*d*.: 111's to 115's, 3¾*d*. to 4¼*d*.; 121's, 3½*d*.; 138's, 3¼*d*.
Pimento—2⅝*d*. per lb.
Rum—Jamaica, 3/- to 3/3; Demerara, 1/2½ to 1/4 per gallon; Trinidad, no quotations.
Sugar—Crystals, 17/6 to 20/6 per cwt.; Muscovado, 16*s*. 1*d*.; Molasses, 14/- to 14/6.

New York,—April 3, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 16½c. to 18c.; Grenada, 17c. to 17½c.; Trinidad, 17c. to 18c.; Jamaica, 14c. to 14½c. per lb.
Cocoa-nuts—Jamaica, select, $26·00 to $28·00; culls, $15·00: Trinidad, $25·00 to $27·00; culls, $16·00 per M.
Coffee—Jamaica, good washed, 8½c. to 11½c.; good ordinary, 6⅝c. to 8½c. per lb.
Ginger—11c. to 14c. per lb.
Goat Skins—Jamaica, 55c.; St. Thomas, St. Croix, St. Kitt's, 53c. to 55c., dry flint; 37c. to 42c., dry salted.
Grape Fruit—Jamaicas, $1·50 to $2·75 per box and $3·50 to $5·60 per barrel.
Limes—Dominica, $6·50 to $8·00 per barrel.
Mace—29c. to 32c. per lb.
Nutmegs—110's, 8½c. to 9¾c. per lb.
Oranges—Jamaica, $2·75 to $3·25 per barrel.
Pimento—5c. per lb.
Sugar—Centrifugals, 96°, 4½c.; Muscovados, 89°, 3·86c.; Molasses, 89°, 3c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., April 21, 1908; Messrs. T. S. Garraway & Co., April 27, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $14·00 to $15·00 per 100 lb.
Cocoa-nuts—$14·60 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·50 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manune, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—Choice, 15c.; Fancy, 17c. per gallon.
Onions—Madeira, $2·10 to $2·50 per 100 lb.
Potatos, English—$2·85 to $3·00 per 160 lb.
Peas—Split, $6·20 to $6·50; Canada, $3·30 to $3·35 per bag.
Rice—Demerara, $5·60 to $5·80 (180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89°, $2·30 per 100 lb., package included; Dark crystals, $2·60; Centrifugals, $2·30 to $2·50 per 100 lb.

British Guiana,—March 31, 1908.—Messrs. Sandbach, Parker & Co.; Messrs. Wieting & Richter, April 18, 1908.

Arrowroot—St. Vincent, $7·00 to $10·00 per barrel.
Balata—Venezuela block, 32c. to 35c.; Demerara sheet, 48c. per lb.
Cacao—Native, 20c. to 21c. per lb.
Cassava—No stock.
Cassava Starch—$7·56 per barrel of 196 lb.
Cocga-nuts—$12·00 to $16·00 per M.
Coffle—Creole, 13c.; Jamaica, 12c. per lb.
Dhal—$5·25 to $5·35 per bag of 168 lb.
Eddos—96c. to $1·32 per barrel.
Molasses—Yellow, 19c.; Dark, 15c. to 16c. per gallon.
Onions—Madeira, 3½c. to 4c.; Lisbon, 3½c. to 4c. Dutch, 3c. per lb.
Plantains—20c. to 64c. per bunch.
Potatos,—English, $2·40 to $2·50 per barrel.
Potatos, Sweet—Barbados, $1·44 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $5·25 for good; Seeta, $6·00 per bag.
Split Peas—$6·00 to $6·10 per bag (210 lb.); Lisbon, $4·50.
Tannias—$1·80 per bag.
Yams—White, $2·16 to $2·40; Buck, $2·64 per bag.
Suoar—Dark crystals, $2·50 to $2·55; Yellow, $2·90 to $3·00; White, $3·60 to $3·70; Molasses, $1·80 to $1·95 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
——Cordwood—$2·40 to $2·64 per ton.

Trinidad,—March 21, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$17·00 to $20·00 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—72c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·60 to $2·80 per 100 lb.
Dhal—$5·00 to $5·25 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 lb. (retail).
Potatos, English—$1·15 to $1·25 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—$5·00 to $5·05 per 100 lb.

A FORTNIGHTLY REVIEW
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Canadian Exhibitions, 1908.

SINCE arrangements are already in progress for holding the Canadian Exhibitions of the present year, the following information will be useful to members of Permanent Exhibition Committees in the West Indies, to whom is entrusted the work of bringing together and shipping representative collections of the products of these colonies.

As mentioned in the last number of the *Agricultural News*, the Toronto Exhibition will open on August 29 and close on September 14, while the Halifax meeting opens on September 2 and closes on September 10. It will be observed that the two exhibitions will be in progress at about the same time, and in consequence it will not be possible, as on previous occasions, for exhibits that have been on view at Toronto, to be afterwards shown at Halifax. If it is desired that the West Indies be represented at both gatherings, it will be necessary to send two sets of exhibits.

In case only one set of exhibits is sent, and no exhibit is made at Halifax, it may be worthy of consideration to arrange at the close of the Toronto Exhibition, that the collection of West Indian produce may be repacked and forwarded either to Ottawa, Winnipeg, Montreal, or some other prominent city, where an exhibition is to be held immediately after the close of the Toronto Exhibition.

Canadian Exhibitions are largely attended by manufacturers, produce merchants, and others from all parts of the Dominion, as well as from the United States. Further, the nature and quality of the exhibits receive due attention and are fully discussed in the Canadian press. These facts, rightly utilized, should prove of great advantage to colonies that are anxious to find a more extensive market for their produce.

The Canadian Exhibitions certainly form the best means of bringing the resources and chief products of the West Indies before the merchants and consumers of the Dominion, and in view of the Conference on Trade

Relations between the West Indies and Canada, held at Barbados in January last, and the considerable interest that has been aroused on the subject, the present is a favourable opportunity for making every effort to promote further commercial intercourse between these two portions of the Empire.

The appointment of a special Trades Commissioner (Mr. E. H. S. Flood) for the West Indies, indicates that the Canadian Government has recognized the possibility of greater development in the trade relations between the two countries, and is anxious to do all that lies in its power to bring about this development.

Intending exhibitors will therefore realize that there is, this year, a special reason for all the West Indies to join in sending representative collections of produce, put up in an attractive and interesting manner, so as to illustrate the commercial resources of the West Indies and British Guiana.

As pointed out in previous years, the specimens forwarded should consist of *bona fide* commercial samples, put up for the most part in bottles, or neat wooden boxes with sliding glass tops. Articles such as sugars, rum, molasses, preserves, honey, cacao, arrowroot, cassava, starches, oils, etc., would be most suitably put up in closely fitting glass jars and bottles. Samples of dried products may be forwarded with advantage in boxes with sliding glass tops. When shown under these conditions persons interested can readily and fully examine and test the quality of the various articles displayed. One of the first duties of the Permanent Exhibition Committees, therefore, will be to arrange for a suitable supply of bottles and boxes. The samples forwarded should naturally be accompanied with full particulars as to their origin, shipping marks, and, as far as possible, prices f.o.b. at the port of shipment.

Further, as on previous occasions, illustrated Leaflets and Handbooks should be prepared beforehand and forwarded to Messrs. Pickford & Black before the exhibitions open. Photographs are also useful in bringing before northern people the conditions and circumstances under which tropical produce is grown and prepared.

In addition to the general exhibits there should be sent a supply of decorative material, such as bamboo stems, dried leaves of the cocoa-nut palm, bunches of cocoa-nuts (strongly wired together) fresh sugar-canes, etc. This material would be utilized in making the West Indian court attractive, and for the purpose of suggesting the tropical conditions under which the crops are produced.

As in past years, Messrs. Pickford & Black have kindly offered to convey all exhibits from the West Indies free of charge, as well as to unpack and arrange them at the exhibitions. The latest steamer that can take general exhibits will be the 'Dahomé,' leaving British Guiana on July 20; Trinidad, July 23; Barbados, July 26; St. Vincent, July 26; St. Lucia, July 27; Dominica, July 28; Montserrat, July 28; Antigua, July 29, and St. Kitt's, July 31. As the Canadian Line steamers do not call at Grenada, exhibits from that island might be sent to meet the 'Dahomé' either at Trinidad or Barbados as found convenient.

The 'Dahomé' is due to arrive at St. John's or Halifax on August 8. The 'Ocamo' which leaves British Guiana on August 1 and is due at Halifax on August 20, will accept fresh fruit intended for exhibition from Dominica and other islands. The 'Ocamo' will call at each island twelve days later than the 'Dahomé', e.g., it will be due at Dominica on August 9. Exhibits should be ready for shipment the day before the steamers are due at each port.

Glass jars and bottles after they are filled should be carefully inspected before shipment in order to detect any leakage. Since they are likely to be knocked about in transit, each bottle should be carefully isolated by being separately packed with straw, shavings, or saw-dust.

Fresh fruit and similar articles to be displayed in the glass bottles, should be placed in a 4-per cent. solution of formaldehyde. This can be made by adding 10 parts by weight of ordinary formalin to 100 parts of water.

It may be pointed out that labels descriptive of the contents of each bottle should be placed near the bottom of the bottle, and not in the middle, in order that the contents may be fully in view. It would be useful too, if each exhibit were numbered, and a list made out and forwarded to Messrs. Pickford & Black, giving the numbers, together with the contents of the corresponding jars and bottles, so that in the event of the labels being damaged in transit, the name of the exhibit and other particulars could be attached at the exhibition.

It is suggested that all correspondence on the subject of the Canadian Exhibitions for 1908 should be addressed to Messrs. Pickford & Black, Halifax, N.S., or, until July 1, to Mr. Charles Pickford, Superintendent of the Pickford & Black Steamship Company, Barbados.

SUGAR INDUSTRY.

Carrington Central Factory, Barbados.

Additional machinery was added to the plant at Carrington Plantation, Barbados, in time for the work of the present crushing season. This machinery has worked very satisfactorily.

The output of the factory, so far, has reached about 1,000 tons of dark crystals, the production being at the rate of 80 to 110 tons per week, according to the rate at which the canes were available. About 700 tons of this sugar are from the two estates Carrington and Chapel, while 300 tons are from other estates, and from canes purchased from peasant cultivators. The canes from the Carrington and Chapel estates have yielded about 2¼ tons of sugar per acre.

Prices have been paid for purchased canes in accordance with the condition of the sugar market. The highest figure paid for labourers' canes was 12*s.* 6*d.* per ton, with the use of the estate carts free of charge In regard to canes purchased from other estates, the highest price paid was 17*s.* 8*d.*, the estates selling the canes being responsible for delivering them at the factory.

An improvement in the present crushing power is under consideration, since the three-roller mill now in use has, it is stated, frequently delayed the triples at their work. It is expected that a new mill will be put down in time for the next season.

Formaldehyde as a Preservative of Cane Juice.

In Hawaii, as in the West Indies, it is the general custom on sugar plantations to add lime to any juice which it may be necessary to keep over for a day or two when cane crushing is temporarily stopped, with the object of preventing fermentation. There are, however, disadvantages connected with the use of lime for this purpose. In the first place lime does not altogether prevent fermentation, not being a very efficient sterilizing agent. Further, the lime combines with the glucose present, forming dark-coloured products, which investigation goes to show are responsible for the 'sweating' and consequent deterioration of raw sugar. Another disadvantage of this course is that the greater part of the excess of lime added is deposited on the evaporator tubes or vacuum pan coils as soon as evaporation begins.

In view of the above objections, the use of formaldehyde as a preservative agent of cane juice has been tested in Hawaii, with apparently satisfactory results. It has been in use for this purpose for a number of years with laboratory samples of juice. The juice experimented with was first clarified by adding milk of lime until just alkaline to litmus, heating to boiling, and then filtering.

In the experiments a very small quantity of formaldehyde (0·025 c. c. per litre of juice or 1 part to 40,000 parts of juice) sufficed to keep the juice from fermenting for twenty-four hours. A considerably increased proportion, i.e., 1 part of formaldehyde solution to 3,500 parts of juice was necessary, however, to prevent fermentation on the second day. When added in this quantity, the proportion of saccharose was still the same at the end of the third day, showing that no fermentation had taken place. When the formaldehyde solution was added at the rate of 1 part to 2,500 parts of juice, it prevented fermentation for four days. When fermentation has once started, it is very difficult to stop it, and under those conditions the experiments showed that 1 part of formalin to 1,600 parts of juice checked the fermentation, after it had been in progress for a short time, for only twenty-four hours.

In ordinary mill work, the amount of formaldehyde required for preservation purposes would probably be somewhat larger than the quantity used in the above experiments, depending on the extent to which the juice was exposed to fermentation organisms. At the Hawaiian and Commercial Sugar Company's factory, where formaldehyde is generally employed, 1. c.c. is added per gallon of juice, which prevents fermentation for from twelve to sixteen hours.

In any mill using formaldehyde for the first time, it would be advisable to have the juice polarized frequently, in order that loss of saccharose might be observed and the progress of fermentation estimated. In this way the minimum amount required for purposes of preservation might be determined.

In the above experiments a 40-per cent. solution of formaldehyde in water (ordinary formalin) was employed.

Sugar Output of Java.

The prosperous condition of the cane-sugar industry in Java is well known, and in view of the account given in a recent number of the *Agricultural News* (Vol. VII, p. 115) of the methods of cultivation followed, a note on the output during recent years may not be without interest.

The Java sugar crop of 1896 amounted to 534,390 tons. From that year up to 1904 there was a steady and consistent increase in the output, which in the latter year reached 1,055,013 tons, or almost exactly double the figure of eight years before. The sugar crop of the island has remained practically constant at this figure during the past three years, and apparently the natural limit of production under existing agricultural and economic conditions has been reached.

The area under cane in Java amounts to about 283,000 acres. There has been a very slight increase during the past two or three years. The greater part of the sugar land is rented from the native Javanese, to whom it reverts every alternate year, when it goes into rice cultivation.

The planters of the island therefore, lose the advantage of the ratoon crop, but on the other hand, they get heavier returns from the plant cane crop, and the land undoubtedly benefits from the change.

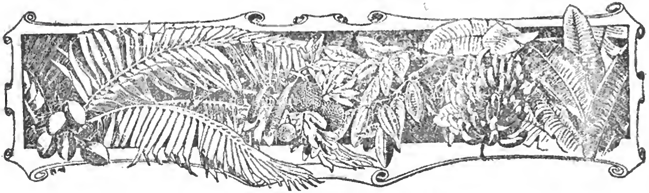
It is stated that the return from cane-sugar cultivation in Java is about double the yield obtained from beet culture in Germany. On the basis of the figures of the past ten years, the sugar return was about 10½ per cent. of the weight of the cane crop, i.e., about 210 lb. of sugar were given by 2,000 lb. of cane.

RED PAINT FOR SHINGLES.

It may be useful to place on record the following recipe for a red paint for shingles which has been furnished by Dr. Francis Watts, who states that it is used by the Colonial Engineer and others in Antigua :—

2 gallons Stockholm tar.
8 gallons boiled linseed oil.
1 cwt. red ochre.

Heat together and apply hot.



WEST INDIAN FRUIT

DOMINICA LIMES.

During the past year the Permanent Exhibition Committee of Dominica has made considerable efforts to bring to the notice of the British public the merits of lime fruits, with a view of increasing the trade in green limes with the English market.

The committee has been fortunate in having the assistance of A. E. Aspinall, Esq., Secretary of the West India Committee. This gentleman made valuable suggestions regarding the best means of bringing limes before the British public, which the local committee was glad to adopt.

The committee made a good display of lime fruits at the Colonial Fruit Show held in London in June 1907. The exhibit received a good deal of notice in the London press. Large posters were displayed drawing attention to Dominica limes, and over 2,000 printed cards giving information about limes were distributed to grocers and fruiterers.

During September, Dominica limes were advertised in the *Grocer Trade Journal*, in the catalogue of the Midland Counties Bakers' and Grocers' Exhibition, and recently in the *Lancet*. It now remains for Dominica planters to further these efforts by making a striking display of lime fruits at the Colonial Fruit Show to be held in London in June next. The following leaderette on 'The Lime and Lemon' which appeared in the *Lancet* of March 20, 1908, is sure to be of interest to lime planters:—

> The lemon is a deservedly popular fruit and serves as the foundation of that excellent beverage known as a lemon squash, which perhaps, is the best example of an absolutely non-alcoholic drink. The lime is not so well known, although from the point of view of flavour it is regarded by many as being even superior to the lemon. In view of the fact that there is now a good and abundant supply of limes to this country, it is interesting to contrast the analysis of this fruit with that of the lemon. According to an analysis which we have recently made, it would appear that the lime, although smaller than the lemon, yields weight for weight a good deal more juice. Thus the average amount of juice expressed from a lemon was 37·50 per cent. of its weight, whereas the lime gave 59·00 per cent. Moreover, the lime gives more citric acid but less sugar, as the following analyses show:—
>
> | | Juice of the Lemon. | Juice of the Lime. |
> |---|---|---|
> | Total solid matters | 8·80 per cent. | 8·64 per cent. |
> | Sugar | 2·30 ,, | 0·70 ,, |
> | Citric acid | 4·57 ,, | 5·60 ,, |
> | Mineral matter | 0·35 ,, | 0·35 ,, |
> | Potash | 0·15 ,, | 0·12 ,, |
> | Phosphoric acid (soluble) | 0·010 ,, | 0·065 ,, |
>
> The lime therefore yields a 'drier' juice and contains a third of the quantity of sugar present in the lemon. The antiscorbutic properties of lime juice may be regarded as more marked than those possessed by the juice of the lemon. While the alkaline salts amount to practically the same in both fruits, yet the phosphoric acid is greater in the lime than in the lemon. It is probably owing to the richness in alkaline salts that the use of lemon juice, as well as other fruit juices, is helpful in some diseases of the skin and in preventing eczema. The juice of the lime is equally valuable in this respect if, indeed, in regard to some dietetic points it is not superior.

MANGOSTEEN AT DOMINICA.

Mr. Joseph Jones has forwarded the following note in reference to the flowering of the Mangosteen at the Dominica Botanic Gardens:—

The Mangosteen tree (*Garcinia Mangostana*) is now flowering for the first time in the Botanic Gardens, Dominica. The plant was received from Kew in August 1892, and is therefore close on sixteen years old. It is now known that the conditions at the Gardens are not altogether favourable for the mangosteen, the soil being too light and the rainfall too low. It is thought that seedling mangosteens may be got to fruit in Dominica in from ten to twelve years when grown in valleys some distance inland which possess a red soil and a rainfall well over 100 inches per annum.

The first mangosteen tree to fruit in Dominica is one grown at St. Aroment, which came from Kew many years ago. Last year it bore a crop of over 300 fruits. Plants raised from seeds sent to the station by Dr. Nicholls, C.M.G., will shortly be ready for distribution.

Other interesting plants now in flower in the Dominica Gardens are the Durian (*Durio zibethinus*), Litchi (*Nephelium Litchi*), Shea Butter tree (*Butyrospermum Parkii*), Cedron (*Simaba Cedron*), Butter Nut (*Caryocar nuciferum*), *Cassia marginata*, and the beautiful West African flowering tree *Baikea insignis*.

GROUND NUT CULTIVATION.

The possibilities of ground nut cultivation are evidently attracting attention in West Africa, since an article on the subject appears in the *Quarterly Journal* of the Liverpool Institute of Commercial Research in the Tropics (January 1908).

This crop is one which is grown on an enormous scale in the United States, where its value is fully recognized. Ground nuts are fairly well known in different islands of the West Indies, but, as frequently pointed out in the *Agricultural News*, the crop is not cultivated to anything like the extent it might be, with benefit to the planting community.

The methods of cultivation of the crop are simple, and the directions given in the article above referred to are necessarily much the same as those contained in Pamphlet No. 25 of the series issued by the Imperial Department of Agriculture, 'Ground Nuts in the West Indies.'

A very light, preferably sandy soil, is necessary for the cultivation of ground nuts in order that the fruits may be easily able to bury themselves on maturity. The crop will not succeed in clays or even in heavy damp loam. A certain amount of lime appears to be necessary for, or at any rate favourable to, its successful cultivation.

The ground ought to be well worked up to a depth of 10 or 12 inches and then thoroughly harrowed, after having been exposed for a few days to the action of the atmosphere. The ground is next ridged up into flat ridges about 4 feet 6 inches wide, with narrow furrows between.

The seeds are set two or three together in pockets about 3½ to 4 inches deep, at distances of 12 inches along the centre of the ridges. It is advisable to manure the bottom of the pockets before setting the seeds, with any rich manure that may be available. About 100 ℔. of seed will be required per acre.

In regard to sowing the seed, a necessary condition for germination and successful growth of the young plants is a moist condition of the soil. The seed should therefore preferably be sown at the commencement of the rainy season. In Barbados this would be about the month of June, and planting in Carriacou, where ground nuts are cultivated, is also done in the same month. In Dominica, good results have followed sowing in September. In the West Indies a period of from four to six months is necessary from the time of sowing seed to gathering the crop. Some American varieties, however, will ripen in three months or so.

Little cultivation is wanted for this crop except weeding. It is well, however, that at the time when the plant is approaching maturity the ground immediately around should be worked up, and loosened with a hoe so that the fruit may easily bury itself. During growth the plant requires a considerable amount of moisture, but a dry condition of the soil at the time of fructification is a necessary factor to the production of a good crop of fruit. Maturity of the crop is noted by the stalks and leaves withering and turning yellow.

In gathering the crop the plants are dug up or pulled up and dried in the sun, the nuts being afterwards detached from the stalks by hand and exposed to the sun as long as possible in order to dry them thoroughly.

Those varieties which chiefly bear their nuts at the base of the main stem entail much less labour in gathering the crop as compared with other varieties in which the nuts occur along the trailing branches.

The yield of ground nuts appears to be very variable, naturally depending to a large extent on the variety cultivated, the nature of the soil, and prevailing climatic conditions. In Senegal, in ground prepared simply by the hoe, the yield is said to be from ½ ton to 1 ton of nuts per acre, while in the same districts, on land receiving better cultivation, manuring, etc., the yield is reported to be as high as 4 tons per acre. An average on properly prepared ground may be taken to be about 1 ton per acre. This may be looked upon as the return which may reasonably be expected in the West Indies. The cost of cultivation of ground nuts in St. Kitt's has been estimated at £1 9s. per acre.

ANTHRAX IN ST. VINCENT.

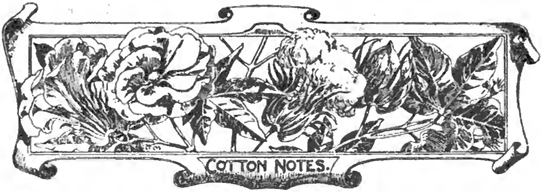
At a meeting of the St. Vincent Agricultural and Commercial Society held on April 18 last, Sir Daniel Morris delivered an address in which he dwelt particularly upon the necessity for compulsory vaccination of all the cattle in the island, if the efforts now being made by the Imperial Department of Agriculture to stamp out the disease are to have any chance of being rewarded with success.

The report of the Government Veterinary Surgeon showed that the disease was still prevalent among the stock of the island and was the cause of much mortality. Statistics showed a total of 969 deaths from August 1906 to August 1907, of which about 500 were from anthrax. Further loss to the island was entailed as the result of the prohibition of stock importation from St. Vincent by other West Indian colonies, with the exception of Barbados.

Under present conditions, stock-owners in St. Vincent could decide for themselves whether or not they would have their cattle vaccinated, but the system of voluntary vaccination has proved futile. Since the introduction of the system about a year ago, only 5,000 animals had been inoculated out of a total of 16,000 in the whole island. The inoculation work had cost a sum of £1,300. It had undoubtedly been the cause of a very large reduction in the number of deaths from anthrax, but while a number of owners refused to have their stock vaccinated, it was useless to hope that disease would be entirely stamped out. Vaccination was free; it was attended with no harmful results to the animals, and was introduced for the welfare of the island. Since it was evident that the voluntary system was ineffectual, legislation making vaccination compulsory should be resorted to.

In conclusion the Imperial Commissioner pointed out that the subject was one which should receive the most careful consideration from the Agricultural Society of the island. Unless inoculation was made compulsory it had been decided that it would be useless to continue the efforts at present made by the Department to stamp out anthrax in the island. The work would therefore cease, the animals at the Stock Farm be removed, and the other colonies be advised to act as they chose with regard to the importation of stock from St. Vincent.

A discussion took place among the members present on the points raised by Sir Daniel Morris, and it was agreed to convene a general meeting of the stock-owners of the island and to consider the matter. It was evident that at the meeting addressed by the Imperial Commissioner there was a general feeling in favour of compulsory vaccination, and it is hoped that those attending the meeting to be held on May 13 will recognize the nature of the situation, and make a united effort to bring about this important and necessary safeguard against anthrax.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of April 27 last, in reference to the sales of West Indian Sea Island cotton:—

> Since our last report West Indian Sea Islands have arrived very freely. The demand from spinners, however, is very limited, the fine spinning industry being in a deplorable condition.
>
> The business amounts to about 200 bales, chiefly St. Croix, Anguilla, and Barbados at 15*d.*, with a few bales extra St. Kitt's at 16½*d.*, and various stains at 7*d.*

COTTON IN THE SEA ISLANDS.

In their Sea Island cotton report, dated April 25 last, Messrs. Henry W. Frost & Co., of Charleston, state that in the absence of demand the market remains nominally unchanged since their last report. In reference to the next season's crop they write:—

> A reduction has been made in the acreage planted in Georgia and Florida, but we are unable as yet to give definite information as to the extent of this reduction. We can only report that the crop has been planted in the three States, and that it is up. So far it has met with no serious set-backs, and has the promise of a rather favourable start.

COTTON SEED IMPORTS INTO BARBADOS.

The Barbados *Official Gazette* of April 27 last contained the following order made by the Governor-in-Executive Committee on April 16:—

> Seed-cotton shall not be imported or brought into this colony from any country.
>
> Cotton seed shall not be imported or brought into this colony from either of the islands of Antigua or St. Kitt's.

CONFERENCE OF COTTON GROWERS AT BARBADOS.

A conference of cotton growers was held at Barbados on Friday, May 15, under the auspices of the Agricultural Society, the object of the meeting being to enable planters and others to consider and discuss the present situation in regard to the Sea Island cotton industry. Sir Daniel Morris, K.C.M.G., was in attendance and took part in the discussion. A summary of the proceedings will be given in the next issue.

WILD JAMAICA COTTON.

Some interesting particulars in relation to a variety of cotton found growing wild in Jamaica, by Dr. N. L. Britton, of the New York Botanic Gardens, when on a botanical expedition to the island, are given in *Science* for April 24 last. Seeds of this cotton were forwarded to the United States Department of Agriculture, and it is stated that the plant will be grown for comparative study with other Central American and West Indian cottons, in the acclimatization and breeding experiments carried on by the Department. In his letter accompanying the seeds, Dr. Britton writes:—

> I am sending a small box of cotton with seeds, collected yesterday near Portland Point, Jamaica, by Mr. Wm. Harris and myself. We were very much interested in observing this cotton plant, which is growing in great abundance at that point, in the extreme southern part of Jamaica, in coastal thickets both in sand, and on nearly level limestone rock where there is scarcely any soil. We noticed it nearly over an area about a mile long and several hundred feet wide. There is a total absence of weeds of cultivation the cotton being associated with characteristic plants of the coastal lowlands. The flowers are small, the petals white with a crimson spot at the base, fading through the day to pink. The pods are small, nearly globular, the foliage pubescent or very nearly glabrous.
>
> There are no white residents at the place. The negroes say that the cotton was brought there in slavery times and planted; but the soil is such that no cultivation would be practicable, and the remarkable absence of weeds indicates that no cultivation was attempted there. The negroes say that it was formerly collected and shipped.
>
> The occurrence of the plant at this place, associated only with native species, has given us a strong impression that it is indigenous, though this may not be the case. At any rate it is a race of cotton that has been probably quite unchanged from its pristine condition.
>
> It at once occurred to us that this variety might prove a very valuable one for breeding purposes, inasmuch as it furnishes a new point of departure. I therefore ask that you transmit the seeds sent to such officer of the Department of Agriculture as will be most interested.

The following notes on this Jamaica cotton, prepared by Mr. O. F. Cook, who is in charge of the breeding and acclimatization experiments above referred to, were published with Dr. Britton's letter:—

> Professor Britton's account of the conditions under

which this primitive type of cotton grows would seem to establish beyond doubt that it is really a wild plant. The very small bolls and sparse lint would seem to preclude the idea that this cotton was introduced into the island for civilized agriculture. If not truly indigenous it must have been introduced in aboriginal times, or by accident.

The existence of wild cotton in Jamaica has been claimed by Macfayden and others; but the evidence has not been convincing. Macfayden described two species of cotton (*Gossypium jamaicense* and *G. oligospermum*) as native of Jamaica, but both are said to have yellow flowers and have been reckoned as forms of Sea Island cotton (*Gossypium barbadense*). White flowers are not known in any cottons of the Sea Island series.

In the characters of the seeds and bolls, Professor Britton's cotton closely resembles a type which grows wild on the Florida Keys. Sir George Watt's recent monograph refers this Florida cotton and other reputed wild cottons from Florida, Jamaica, Curaçao and other West Indian localities to *Gossypium punctatum*, a species originally described from Africa. The same author reckons *Gossypium punctatum* as one of several ancestors of our United States Upland varieties, because a few of our Upland cottons have the red spots at the base of the petals. The argument is far from conclusive, for red spots occur in many widely different types, and are probably an ancestral character of the genus.

The seeds of this wild Jamaica cotton show a very interesting diversity. In addition to the lint, a majority of them have a dense adherent covering of brown fuzz, but on some the fuzz has a dull greenish tinge, while in still a third group most of the surface is smooth and naked, the hairy covering being limited to a tuft of brown fuzz at the base of the seed, and a tuft of lint at the apex. The presence of all three conditions in the same lot of seeds of this primitive wild type of cotton may help us to believe that similar diversities inside our Upland varieties do not, of necessity, prove hybridization, but may represent a normal range of ancestral diversity in this group of plants.

The usual correlation of greater length and smaller quantity of lint on smooth seeds also holds good. The lint from the smooth seeds averages 31·3 millimetres, that of the fuzzy seeds 30 millimetres. The lint represents 16·03 per cent. of the total weight of the smooth seeds, and 18·27 per cent. of the fuzzy seeds. The smooth seeds weigh, without the lint, at the rate of 4·23 grammes per 100, the fuzzy at the rate of 4·97 grammes. If the fuzz were removed and weighed with the lint, the proportion of fibre to seed would appear still higher with the fuzzy seeds. The slight increase of length of fibre on smooth seeds is accompanied by a disproportionate reduction of the quantity of fibre.

WEST INDIAN AGRICULTURAL CONFERENCE, 1908, AND ST. VINCENT DELEGATES.

The Hon. E. J. Cameron, Administrator of St. Vincent, in a letter to the Imperial Commissioner of Agriculture, dated April 23 last, writes:—

> I desire to express my satisfaction at the opportunities given by the Imperial Department of Agriculture to representatives from St. Vincent to attend these important Conferences, and at the same time would beg to express my appreciation of the attention and kindness received by them in Barbados.

SCHOOL SHOWS AT TRINIDAD:
Award of Medal for Best Exhibits.

With the object of encouraging agricultural instruction in the public elementary schools of Trinidad, the Agricultural Society of the colony has for some years past offered a challenge medal for open competition, to be awarded to the school which is adjudged to have sent in to the annual School Shows (five of which are held each year) the best collection of exhibits, which must have been produced by the pupils in garden plots connected with the school.

In 1904 this medal was won by the Couva Government School; for three years in succession it was then won by the Careenage School, and this year the medal was awarded to the Arouca Government School, in the Tacarigua Ward, of which Mr. Sydney Smith is head-master.

In the presence of a large gathering at the school on April 24 last, the medal was presented to Mr. Smith, by the Hon. S. W. Knaggs, Acting-Governor of the colony.

Speeches were made by Lt.-Col. J. H. Collens (Chief Inspector of Schools), his Excellency the Acting-Governer, and Mr. Warner (Warden of Tacarigua), all of whom referred to the value of the inclusion of agricultural teaching in elementary school work. In his reply Mr. Smith stated that his pupils had shown the greatest interest in agriculture and school garden work ever since the first introduction of the subject into the school course.

THE CASHAW TREE IN HAWAII.

The leguminous tree known as the Cashaw or mesquite (*Prosopis juliflora*) is a native of Central America and of Jamaica. It is very abundant in the dry districts of the latter island. In Mexico and Hawaii the tree is known as the 'algorobo.' The cashaw grows to a height of 30 or 40 feet, and yields a very hard wood, which however splits readily, and makes excellent shingles. It is also of great value for fuel. The seed-pods of this tree form a nutritious stock food, although cases are reported in which horses have died after eating them. This is probably due to the seeds germinating in the stomach.

An extract is here given from an article dealing with the spread of this tree in Hawaii, which appeared some time ago in a Hawaiian journal:—

> No other imported tree has spread so rapidly or has proved to be so valuable in Hawaii as the mesquite. Since its introduction it has spread over more than 50,000 acres of what otherwise would be worthless land. It grows best on the lowlands, but by gradual acclimatization it now thrives at an altitude of 2,500 feet. The tree is seldom found growing well on the windward side of the islands because the salt air blasts the foliage.
>
> It has become the principal fuel tree of the islands on account of its high calorific value, rapid growth, ready regeneration, and accessibility to market. The pods, borne on the trees in immense quantities, are rich in nitrogen, and form one of the principal foods for the fattening of cattle, horses, and other stock. The flowers furnish an excellent, clear honey, and most of the apiarists depend entirely on the mesquite for the pasturage of their bees.
>
> The rapid spread of the tree in Hawaii is due entirely to cattle and horses, which do not injure the seeds in the eating of the pods, but rather prepare them for quick germination.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The question of West Indian exhibits at the Canadian Exhibitions of the present year is discussed in the editorial, which also contains useful hints as to the most suitable methods of putting up and forwarding exhibits, etc.

In experiments carried out in Hawaii on a practical scale, formaldehyde in small quantity proved itself to be an efficient preservative agent of cane juice (page 147).

The brief article 'Dominica Limes' on page 148, indicates that this fruit is becoming better known in England, and growing in favour as compared with the lemon.

Compulsory vaccination of stock as a preventive against anthrax is a question that is occupying public attention at present in St. Vincent. Unless this system is adopted, further attempts to stamp out anthrax in the island appear hopeless (page 149).

Reports on market prices and other brief notes will be found on the cotton pages (150-1). There is also an interesting account of a variety of cotton, discovered growing wild in Jamaica, and which is thought to be indigenous to the island.

A preliminary report on an insect pest of cotton that has been giving considerable trouble at Antigua during the past season appears under Insect Notes (page 154).

Root disease of sugar-cane has also been prevalent in Antigua in the past year. Some notes on measures that may be useful in connexion with its eradication are given on page 155.

Rubber Lands of British Guiana.

According to an official statement, the Government of British Guiana will receive and consider applications for tracts of Crown land, of any size, within the colony, under leases for ninety-nine years for rubber-planting purposes. The land will be rent free for ten years, with the right of purchase after that period at 16*s.* 8*d.* per acre. If the holder does not exercise this right of purchase, the rent charge will be 10*d.* per acre per annum from the tenth to the fifteenth year, and 2*s.* 1*d.* per acre per annum afterwards.

Crown land from which areas may be selected is available on all large rivers and tributary streams, and within easy communication of Georgetown.

The mean total yearly rainfall in districts most suitable for rubber cultivation is 96·57 inches.

Egg Preservation.

Egg preservation is carried on on an enormous scale in Denmark, and according to a recent report, many of the eggs shipped abroad have already been preserved for four or five months. The material used for this purpose is chiefly water-glass (a solution of silicate of soda), although lime water is also largely employed, since it is cheaper and gives almost equally good results. With lime water however, the shell of the egg is hardened and roughened, which is not the case with water-glass. The eggs are laid down in enormous tanks, which will hold from 70,000 to 80,000, and the tanks are then filled nearly to the top with the preserving fluid. These tanks are built in cool, underground cellars. For successful results it is essential that the eggs should be fresh before laid down. On removal from the solution, the eggs are well washed in running water, and dried in the air before being placed on the market.

Paper Manufacture From Megass.

Samples of unbleached paper, prepared from cotton stalks were exhibited at the late West Indian Agricultural Conference at Barbados. This paper was made by a process devised by Mr. Bert de Lamarre of Trinidad, who owns extensive estates in the island, and reports from Trinidad now state that, being convinced of the practical possibilities of paper manufacture from megass, banana fibre, Para grass, etc., Mr. Lamarre has erected a paper pulp works at very considerable cost, in conjunction with the sugar factories of the estates.

According to an account which appeared in the *Port-of-Spain Gazette*, the megass, after treble crushing in the cane mills, is conveyed to the paper works, where it undergoes the treatment devised by the owner. It is boiled for some hours, further crushed by rotating millstones, and then passed through ordinary pulp-making machinery. Finally it is cut and baled under hydraulic pressure. If this method of utilizing the megass is found to be a remunerative one, a valuable subsidiary industry to cane-sugar production may thus be indicated.

Mangrove Bark in British Guiana.

A sample of mangrove bark (from *Rhizophora Mangle*) was forwarded to the Imperial Institute sometime ago for examination and report. It consisted of a thick, dark, reddish-brown bark of dense structure, which contained very little fibre, and was readily ground to powder. On analysis at the Imperial Institute this bark yielded 25 per cent. of tannin. When tested in tanning the bark produced a medium reddish-brown leather, of the kind furnished by typical mangrove barks of commerce. The report points out that the percentage of tannin is not sufficiently high to allow the bark to be exported to Europe with any expectation of profit, but that it would probably yield a satisfactory mangrove extract, which should answer well for local use.

Rubber Exhibition in London.

The International Rubber Exhibition, to be held in London in September next, and of which full particulars were given in the *Agricultural News* of March 21 last, is apparently being well supported by planters, manufacturers and others, since, on account of the large number of applications for space that have been received, it has been decided that the Horticultural Hall, where it was first intended to hold the show, will not be large enough, and the exhibition will therefore take place at the Olympia. Further, it will remain open for a fortnight from September 14, instead of for a week only. As mentioned in a previous issue, Trinidad and Dominica have already arranged to send samples of rubber, etc., to the exhibition, and later reports state that British Guiana is also forwarding specimens of *Sapium* rubber together with balata of various grades. It is suggested that the smaller islands should combine to make a joint exhibit, entrusting the arrangements to the Secretary of the West India Committee, to whom all correspondence and specimens might be addressed.

Tobacco-breeding Experiments.

Experiments in plant selection and plant breeding are always of interest to cultivators, since they indicate a line of work which, if consistently followed up on a definite basis, necessarily results in improvement in the type of plant cultivated.

A bulletin (No. 96 of the Department of Plant Industry) lately issued by the U. S. Department of Agriculture contains much information as to variability and its causes among tobacco plants, together with an account of plant-breeding experiments having for their object improvement in the shape of the leaf, modification of size, control of number of leaves, production of non-suckering types and of early varieties, and improvement of burning qualities. The bulletin also includes descriptions of methods of saving seed, of seed separation, of a new variety raised by seed selection, and of others produced by cross-fertilization.

Danger from Imported Seeds and Plants.

A planter in Grenada, who at the end of last year imported some maize from the United States, found on examination of the grain after it had been stored for a time that it was infested with thousands of small caterpillars. In the usual course these caterpillars developed into small brown moths, which laid eggs not only on the maize, but on some unbagged cacao stored in the same place. The caterpillars of the next generation attacked the cacao as well as the corn, doing equal damage to both.

Specimens of the moth were submitted to the Entomologist of the Imperial Department of Agriculture, and in the opinion of this officer the insect is the Angoumois Grain moth (*Gelechia cerealella*). Suggestions were offered as to the likely methods of getting rid of the pest, and the steps taken are reported as having been attended with success. The room has been fumigated, and cacao is no longer stored there. A few grains of corn were scattered daily to attract the moths for egg-laying purposes, these grains being afterwards fed to hens and replaced by fresh ones.

The above incident illustrates the bad results which may easily follow importation of seeds and plants from other countries if these imports are not submitted to fumigation on arrival. In this case, fortunately, the results were not as serious as might easily have been the case.

Agricultural Co-operation.

The benefits of co-operation among agriculturists for the sale of crops (more especially fruit and vegetables), and for the purchase of manures and necessary supplies are stated in recent reports to be widely recognized in the United States, and such organizations exist in that country in large number. By their means small growers are able to combine their produce and secure minimum transportation rates on account of the larger volume. They are also in a position to secure more advantageous terms on the market, not only because they approach it as a united body, but also because in the case of an organization handling a large quantity of produce, uniform grading and packing, etc., are more possible, which has an influence on the prices obtained. Further, through the association, members can obtain implements, manures, packing materials, spraying outfits, etc., at greatly reduced cost.

In the United Kingdom, more particularly in Ireland, the co-operative movement has made great advances during recent years. The chief agricultural co-operative organization in England is the Agricultural Organization Society, the headquarters of which are in London, and which has some hundreds of branch associations in all parts of the country. The chief value of the Organization lies in its power to purchase farm supplies from wholesale merchants and manufacturers at greatly reduced rates, which supplies are then distributed to local societies and through these to the individual members. It is by some such method as this most probably, that any co-operative movement would be most beneficial to the planting community of the West Indies.

INSECT NOTES.

Flower-bud dropping of Cotton at Antigua.

Early in the present year some cotton growers at Antigua, in going over their cotton fields, observed that numbers of the flower-buds on the plants had dropped off to the ground just at the period when they were about to open into flower. The attention of the Imperial Department of Agriculture was called to this occurrence, and as it was believed that the trouble was due to some insect pest, the Entomologist paid a short visit to Antigua in February. After returning to Barbados for a fortnight, a second visit of a month's duration was made by Mr. Balion from March 6. During the fortnight's interval between the two visits, it was evident that conditions had much improved, and many plants which previously had not a flower on them were reported to be beginning to bloom freely. This improvement continued throughout the second visit, and by the end of March the pest had practically disappeared, and the flower-bud dropping had almost entirely ceased.

The following forms the chief portion of a preliminary report furnished by Mr. Ballou on his investigations into the cause of the trouble, which he had previously determined to be a small fly belonging to the natural order Diptera, and to the family Cecidomyiidae:—

I devoted myself to a study of the insect, in order that I might get as much information as possible, and a few experiments were established. As a result of this study, it appears that the maggots leave the bud soon after it falls, and go into the ground to pupate. The pupa is naked, the pupal covering very thin and delicate, and pupation is carried out some 1 or 2 inches beneath the surface. The duration of the pupal stage is about ten to fourteen days.

The flies live but a few days after reaching the adult condition. The female punctures the tissue of the bud with the ovipositor, and inserts the eggs. Probably several females lay their eggs in the same bud. I have found as many as forty-three maggots in one bud, and these of such varying sizes as to indicate several depositions of eggs. The length of time taken for the eggs to hatch, and for the maggots to become full grown has not been ascertained, but the indications are that it is very short, probably not much more for eggs and larval stages together than is required for the pupal stage. If this supposition is correct, the total length of time required for the life cycle is about four weeks.

As stated in the report on my visit to Antigua in February, most of the cotton planted previous to August 15 made a fairly good crop, while the greater part of that planted from September 1 did not give a crop. A few of the earliest blossoms on September cotton escaped attack, and again blossoms escaped in early February. The former of these gave a few bolls which were ripening in March. The few flowers which escaped attack in February resulted in bolls which, at the beginning of April, had made good development.

The first indication of the presence of the disease in Antigua was the excessive dropping of the buds. Then it was found that in the case of many of the buds the bracts, instead of remaining closed (adpressed) around the bud, had flared out in a striking manner, and on examination it was found that all buds with 'flared' bracts were infested, and I later discovered as the result of examination of large numbers of buds that nearly all infested buds become 'flared' before dropping.

The conditions which have led up to this remarkable and very serious outbreak of this new pest can only be surmised, but from the evidence at hand it would seem that the surmise is well founded.

In the first place the pest is probably a native of Antigua, or at least not a recent importation. This is borne out by the fact that it appeared in all parts of the island almost simultaneously and with a uniform degree of severity. The fly is very fragile and probably not capable of any long flight, nor of being carried far by the wind. Secondly, the weather conditions in Antigua have been rather unusual for the past eighteen months. Beginning with the very heavy rainfall of September 1906, Antigua has experienced wet and damp weather in rather an unusual degree in many parts, without perhaps recording a rainfall much, if any, above the average. This dampness, with the stronger growth of the plants, the moister soil, and the great tendency to weeds in the fields, gave the maggots as they fell to the ground a better opportunity of pupating than under the normal conditions in Antigua. It was noticed on several estates that cotton fields in which there was a tendency to damp soil, and where a strong, vigorous growth of plants covered the ground, were more severely attacked than the fields in which the soil was drier and the plants smaller. When, as sometimes happened, there was a strong tendency toward a rapid growth of weeds on the damp soils, the difference was still more noticeable.

Two small insects which belong to the parasitic Hymenoptera were very common in all infested cotton fields. One of these I found to be a very active enemy of the maggot in the flower bud, and I believe the other to be the same, but I have not yet proved this point.

It is likely that the sudden improvement in the condition of the cotton fields and the almost total disappearance of the maggots are due to the drier weather, and hot bright suns of February, together with the beneficial effects of the parasitic enemies of the maggots.

Up to the present time no remedial measures have given definite results. Experiments have been started and it is hoped that they may give results that will be useful. The use of Vaporite seemed likely to be beneficial, and several applications of this material have been made. Vaporite is a proprietary material sold by Strawsons & Co., England. Its object is the killing of insects in the soil, and it was hoped that during the time when the maggots and the pupae were in the soil, the effect of the Vaporite fumes would be sufficient to kill most of these insects.

Cultural methods may reduce the loss from this form of flower-bud dropping. Any system of planting and tillage which allows the sun to get freely to the ground around the plants, and which keeps the surface thoroughly pulverized, dry, and free from weeds, would seem likely to be useful. Wet weather, damp surface soil, and the presence of weeds, seem to be favourable to the increase of the pest.

The insect which causes this dropping of flower-buds of cotton has recently been determined, by Dr. E. P. Felt, New York State Entomologist, to be a new species of the genus *Contarinia*, and he proposed to give it the name *Contarinia gossypii*.

SUGAR-CANE DISEASE AT ANTIGUA.

Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the staff of the Imperial Department of Agriculture, visited Antigua from April 12 to 18 to enquire into the fungus diseases of plants in that island. The following extract dealing with root fungus of the sugar-cane (*Marasmius Sacchari*) in Antigua, is taken from Mr. Stockdale's report on his visit:—

The root fungus disease of sugar-cane was the disease to which chief attention was given during this visit to Antigua. This disease is wide-spread, and undoubtedly has been the cause of some of the small yields of cane obtained from several fields in the island. In some cases its effect was the more marked, and owing to various conditions, over some of which the planters may have had no control, certain individual fields had suffered considerably. The presence of the disease was known to the planters, all of whom seemed ready to apply such remedial measures as could be suggested, and to carry out experiments that would be of value in increasing knowledge as to the effects of the fungus on the canes under varying conditions and as to various methods of control.

By the examination of the trucks of canes as they came to the mill at Gunthorpes factory, it was observed that the distribution of the fungus might be supposed to be general. The fight between host and parasite is so evenly matched that but a small disturbance in the external conditions may very easily lead to the one or the other getting the upper hand, and therefore it is to be strongly urged that the attention of the planters should be especially directed towards doing everything that may possibly assist the sugar-cane in its fight with the fungus. Dr. Watts has made a careful survey of the island, and has informed planters of the life-history of the fungus and its remedial treatment. With a view, however, of showing the planters that the Imperial Department of Agriculture is desirous of assisting in every way possible, I would suggest that a series of experiments with different remedial measures for root fungus disease of sugar-cane should be organized at an early date. I would also venture to suggest that separate reports might be sent to the managers or attorneys of the estates that I visited, dealing directly with the problems on their estates.

For the treatment of the root fungus disease of sugar-cane at Antigua, I would suggest that all estates should make it a general practice to throw out of cultivation one or two of their worst fields every year, with the view of planting rotation crops. If the fields are badly diseased it might be advisable that all the old diseased stumps should be dug out and burned before the fields are put into cultivation. I have seen no case, during this visit to Antigua, of fields so badly diseased as to warrant the burning of the trash; but trash from diseased fields should not be put into pens for manure. If the throwing out of one or two badly diseased fields every year were generally adopted on the estates, it would be rendered imperative that the trash should be burned in order to allow of thorough cultivation for the rotation crops, and I would suggest for the consideration of Dr. Watts that experiments in this direction might be commenced. The humus problem is an important one in regard to the Antigua sugar-cane soils, and therefore it would serve a useful purpose if definite information could be gained as to how often trash may be burned off without causing any serious effect upon the condition of the soils. This matter was brought up for discussion by Dr. Watts, and I think that carefully planned experiments in this direction might be tried in certain districts of the island. The use of lime as a fungicide should receive careful consideration, for it is possible that lime may play an important part in the control of this fungus disease. The maximum quantity of lime that the land will stand without danger to the various nitrification changes could be recommended.

In the choice of rotation crops, cotton might be included and also, perhaps, various forms of green dressings. Sweet potatos, in view of their being liable to be attacked by what would appear to be the root fungus of sugar-cane, should be watched and should only be recommended with caution. Near relations of the sugar-cane, such as maize, Guinea corn, etc., also should receive careful attention if they are used as rotation crops, for if they are found to be affected they could not serve their purpose as rotation. Guinea corn I have not known to become affected, but, in view of what was noticed with Indian corn (maize) during this visit to Antigua, I should be inclined to view this plant with suspicion. The evidences are not sufficient to condemn this crop for rotation purposes as being liable to be attacked by the root fungus of sugar-cane, but I should recommend that it be carefully watched.

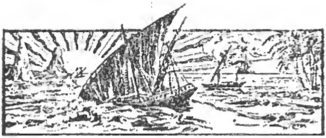
RICE CULTIVATION.

An article under the above heading appeared in the *Agricultural News* (Vol. V, p. 411) giving an account of experiments carried out in Ceylon, the results of which clearly indicated the great advantage to the rice grower of sowing his seed in a seed-bed, and afterwards transplanting the seedlings to the field. Experiments in rice cultivation have also been lately carried out at the Raipur Government Farm, Central Provinces, and the results are also in favour of transplanting the seedlings as opposed to sowing broadcast in the field.

The following notes on the Raipur experiments are taken from the *Agricultural Gazette* of the Central Provinces, for August 1907:—

These experiments were carried out in series A and B, A being irrigated and B unirrigated. Both series of plots were uniformly manured with cattle-dung, estimated to contain nitrogen at the rate of 20 lb. per acre. The plots were each $\frac{1}{16}$ acre in area.

The transplanting plot has done best every year, and has yielded a net profit that is double that of the second best plot. It is often stated by cultivators who have never tried transplanting that the system is suitable for irrigated paddy only, and that even then it is not profitable on account of the additional cost of labour involved. The results of this series of experiments prove that both these statements are doubtful, for the plots were not irrigated, and in calculating the profits derived from them, the cost of cultivation has been deducted in each case. Transplanted rice grown under irrigation gives a still higher profit, despite the fact that the cost of cultivation in this case is still increased by a water rate of 1·14 rupees per acre. With the exception of broadcasting, transplanting is the cheapest of all the methods experimented with, as it reduces the weeding charges very considerably. The weeds are so thoroughly eradicated by the ploughing given to the plot before transplanting that after-weeding is seldom necessary. The extra cost of transplanting is much less than the extra cost of weeding entailed by other methods of cultivation. A most important factor in the cost of cultivation is that, whilst broadcast sowing requires about 80 to 100 lb. of seed per acre, transplanting requires only 20 to 30 lb. of seed for the same area.



GLEANINGS.

A supply of good, fresh lime seeds is required by the Agricultural Superintendent of St. Lucia, who will be glad to hear from persons having seeds available.

Reports from Demerara state that there is a great scarcity of provisions on the Georgetown market. A regular supply of sweet potatos, however, is being received from Barbados.

At the last monthly meeting of the Barbados Agricultural Society it was decided that a ploughing match should be held in the island at some time in the present year.

The *Port-of-Spain Gazette* reports that rice cultivation is much on the increase in the southern districts of Trinidad. The cultivation is chiefly carried on by coolie labourers.

The seedling canes D. 74 and D. 95 are reported to have again done well in Louisiana during the past crop season. Of the two canes, D. 74 is, on the whole, regarded with the more favour. (*Sugar Planters' Journal.*)

The Agricultural Superintendent of St. Lucia has about 600 strong plants of Para rubber (*Hevea brasiliensis*) in bamboo pots, ready for immediate distribution (in St. Lucia only), at 6*d.* per plant.

The St. Lucia Agricultural Society is importing £10 worth of the best Sea Island cotton seed for gratuitous distribution to intending planters during 1908. All applications should be made to the Agricultural Instructor.

The value of the canes purchased from cane farmers by the sugar factories in the Naparimas and Savannah Grande districts amounted to £29,250 from the beginning of the present season up to April 25 last. (*Port-of-Spain Gazette.*)

Mr. W. C. Fishlock, Agricultural Instructor of the Virgin Islands, writing on April 20 last, reported that the present season's cotton crop of the Virgin Islands so far gathered, amounted to 112 bales of 200 lb. each. The total crop will probably amount to 120 bales. Last year only 51 bales were shipped.

With the object of extending the bee-keeping industry of the island, the St. Lucia Agricultural Society is ready to import, under certain conditions, $30 bee-keeping outfits for intending bee keepers. Applications should be made to the Secretary of the Society as early as possible.

The sugar-cane products exported from Barbados from January 1 to May 7, 1908, amounted to 12,381 tons of sugar and 23,690 puncheons of molasses as against 9,243 tons of sugar and 29,147 puncheons of molasses for the corresponding period of last year.

At the meeting of the St. Vincent Agricultural Society held on April 18 last, Sir Daniel Morris informed the members that he would make enquiry into the matter of adding an oil plant to the Central Cotton Factory. If he found that the local demand for oil was considerable, he was prepared to assist in providing an oil-extracting plant.

The colony of Martinique has increased the duty on dry or unprepared tobacco leaves from 2·05 francs ($0·39) to 3·35 francs ($0·638) per kilogram (2·2 lb.). The duty on prepared leaves, or black tobacco as it is called, still remains the same, 2·05 francs per kilogram. (*U.S. Consular Reports.*)

The African woolless ram sheep 'Egba,' imported by the Imperial Department of Agriculture, has been loaned for service in St. Lucia, and is stationed at the Agricultural School, Union. The service fee is 1*s.*, which may be reduced in the case of peasant proprietors, at the discretion of the Agricultural Superintendent.

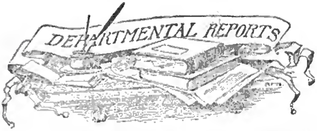
An Ordinance has been passed in Trinidad making it illegal for any person to have or keep in his possession mungoose for breeding or any other purpose. It has been thought that under previous regulations mungoose were being bred in the island in order to obtain the reward offered for their destruction.

There are three beet sugar factories in Canada, and the industry is liberally subsidized by the Dominion Government. In spite of this, however, the figures for the past three years show a decline in the production. In 1905-6 the output of beet sugar was 11,419 tons; in 1906-7, 11,367 tons were produced, while in 1907-8 the production fell to 7,943 tons.

In reference to the project (mentioned in the *Agricultural News*, Vol. VII, p. 60) to introduce sisal hemp cultivation on an extensive scale into British Guiana, the *Demerara Chronicle* of May 1 reports that the whole of the capital necessary has now been subscribed. The area of land conceded by the Government for this purpose comprises about 7,000 acres, and is situated near Bartica.

Java exported only 32 cwt. of sugar to Great Britain during the first two months of 1907, as compared with 33,000 cwt. shipped during the corresponding period of the present year. The shipments from Peru have increased from 74,000 to 188,000 cwt. On the other hand, the German exports of sugar to Great Britain dropped from 1,611,822 cwt. in January and February 1907, to 1,255,000 cwt. in the same period of 1908.

The cultivation of the sunflower, for the sake of the oil in its seed, appears to be attracting a good deal of attention in South Africa. In that country a yield of as much as 3,250 lb. of seed per acre has been recorded, although in most countries 1,500 lb. per acre seems to be a fair average. From 15 to 20 per cent. of oil can be obtained from the seed, and the better qualities are sometimes employed for cooking purposes.



ST. VINCENT: ANNUAL REPORT ON BOTANIC STATION, AGRICULTURAL SCHOOL, LAND SETTLEMENT SCHEME, AND GOVERNMENT VETERINARY SURGEON, 1906-7.

This report is more full and interesting than has been the case in past years, since it contains a historical account of the Botanic Station, and is well illustrated by reproductions of several photographic views. The historical portion includes extracts from the descriptive account of the old Botanic Garden (founded in 1765, and on a portion of the site of which the present station stands), prepared by the Revd. Landsdowne Guilding, and published in 1825. It was for the St. Vincent Botanic Gardens and the Gardens at Jamaica, that a special expedition was sent to the South Seas in 1790, to procure specimens of the bread-fruit tree and other interesting plants. About 530 plants of different kinds were brought to St. Vincent as the result of this expedition. The present Station was organized in 1890. Mr. W. N. Sands, the present Curator, was appointed in 1904.

The report also contains an account of the efforts made by the Imperial Department of Agriculture to assist the various agricultural industries of St. Vincent, and the planting community generally. The most successful efforts of the Department have been in connexion with the cotton industry, which has proved particularly remunerative in St. Vincent. The erection of the Central Cotton Factory in 1903-4, at the instance of the Imperial Commissioner of Agriculture, with the approval of the Secretary of State for the Colonies, may be specially mentioned. This factory cost nearly £2,000 to build and equip, and is capable of ginning 4,000 ℔. of lint in eight hours.

Other industries, e.g., cacao, arrowroot, live stock, etc. have made advances during the past nine years. While in 1900 the cacao exported from St. Vincent amounted only to 443 bags, the shipments for 1906 reached 1,129 bags, of an estimated value of £3,838.

The St. Vincent Agricultural School was started by the Department in 1900, and has largely fulfilled its object. The number of boys on the school books average about twenty-three.

The agricultural efforts in connexion with the Land Settlement Scheme have been under the charge of the Imperial Department of Agriculture since the start. The Agricultural Instructor devotes the whole of his time to the work of visiting the allotments, and giving necessary advice and help to the allottees. Considerable progress has been made in planting permanent economic crops on the estates, and towards this end the Department has annually distributed free, a large number of plants and seeds.

Coming to the work of the year under review, it is mentioned that the expenditure on the Botanic Station was £571 12*s.*, while the receipts from the sale of plants and produce amounted to £21 18*s.* 7*d.* This latter figure shows a falling off as compared with the receipts for the previous year, which is accounted for by the fact that increased attention to Sea Island cotton cultivation lessened the demand for other economic plants. This is still more noticeable when the number of plants distributed is compared with the number sent out in the previous year. A total of 10,143 was distributed in 1906-7 as compared with 17,543 sent out in 1905-6.

The progress of the cotton industry during 1906-7 is reported upon at considerable length. The work of selecting and disinfecting seed was continued at the Central Factory and over 18,000 ℔. of seed were dealt with and distributed to local growers. The total area planted with cotton in St. Vincent in 1906-7 was 1,535 acres, and the yield of lint reached 253,704 ℔., or an average of 175 ℔. per acre. Cotton plant selection experiments were undertaken on several estates in the island by officers of the Department during the year.

The expenditure on the St. Vincent Agricultural School during 1906-7 amounted to £565 8*s.* 8*d.*, while a sum of £20 12*s.* 11*d.* was derived from the services of animals and the sale of plants. Twenty-one boys were reported to be on the school books, with two probationers. The results of the half-yearly examinations held at the school were satisfactory and encouraging.

In addition to the ordinary school routine the boys receive training in practical agricultural operations, such as cultivating, manuring, mulching, etc. Considerable assistance is also given by the boys in the work of the experiment plots. During the year a fine Ayrshire bull, a grade Ayrshire cow, a thoroughbred stallion horse, and a Maltese donkey stallion were imported for the Stock Farm carried on in connexion with the school.

The work in connexion with the Land Settlement Scheme showed satisfactory progress during 1906-7. The allotments at the close of the year numbered 574. Cacao appears to form the chief crop planted, and it is estimated that over 60,000 cacao trees are now established on the estates. Other crops receiving attention are coffee, nutmegs, pepper, oranges, sugar-cane, arrowroot, cassava, etc. The establishment and maintenance of a good system of wind-breaks, composed of Galba trees, form an important feature in connexion with the St. Vincent Land Settlement Scheme.

The report of the Government Veterinary Surgeon, which is also included, deals with the period from August 19, 1906 (date of appointment), to March 31, 1907. The sum expended in connexion with the department of this officer, for the above period, amounted to £386 13*s.* 9*d.* Tables are annexed to the report showing the number of cases of anthrax that occurred in the island, and also the stock mortality, etc.

DEPARTMENT NEWS.

The Imperial Commissioner of Agriculture, who has been paying an official visit of inspection to the Leeward Islands, returned to Barbados by the R.M.S. 'Eden' on May 5.

Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the staff of the Imperial Department of Agriculture, who has been for some weeks in St. Lucia, Antigua, and Dominica, investigating the fungus diseases of plants in those islands, more particularly the root disease of the sugar-cane in Antigua, also returned to Barbados by the same boat.

CULTURE OF CASTILLOA RUBBER.

The *Year-book* for 1907-8 of the Mexican Rubber Planters' Association has lately been issued, and contains a full account of the proceedings that took place at the first meeting of the association in October last. Some interesting and valuable papers dealing with various phases of the rubber industry, that were read at this meeting are also reprinted in the year-book, one of the most important being that by Dr. Pehr Olsson-Seffer, entitled 'The Present Condition of Rubber Culture.'

Dealing with the cultivation of the Central American rubber tree (*Castilloa elastica*), Dr. Olsson-Seffer remarked, that although there was still much to learn, yet many points had already been settled and were beyond discussion. It was known, for instance, that Castilloa trees need an open, porous soil, well drained, but with sufficient underground water supply. The physical condition of the soil is of more importance than its chemical composition. Stagnant water, or an acid condition of the soil, is naturally detrimental to the well-being of the trees.

On thin soil with impermeable subsoil, Castilloa will do well for a few years, but growth ceases, and the tree is liable to die back when the roots reach water.

The much-debated question of shade in rubber culture was then referred to. Mexican planters are still undecided as to the necessary amount of shade for Castilloa trees, as well as the best method of providing this. Later experience has not tended to confirm the opinion, popular in the early days of rubber culture, that the provision of heavy shade is essential. Under such conditions, the rubber trees grow tall, but there is no corresponding increase in the circumference of the trunk. Further, trees planted under shade appear to be sickly and liable to disease.

Castilloa trees undoubtedly derive advantage from a certain amount of shade and shelter during the dry season, and bearing this in mind, many growers, in clearing ground for rubber planting, have left a small number of the original trees to overshadow the Castilloa plants. This state of semi-shade is likely to be specially beneficial where the soil is liable to become hard and baked on exposure to the sun.

It was pointed out that the amount of shade required for proper development is best supplied by paying full regard to close planting in setting out the young Castilloa trees. Such a method ensures soil preservation, and also provides the best conditions for symmetrical development of the trees. As with increasing growth, the trees interfere with each other, thinning-out operations should commence.

Efficient drainage is highly essential to success in starting a rubber plantation. Every slope of the ground should be taken advantage of in this connexion. On plantations in the East the drains are always laid down before the rubber trees are planted.

Some Mexican cultivators sow the rubber seed directly in the open. Unless this is done at a time when the soil is fairly moist, complete failure of germination may result. Planting in the open should preferably take place at the beginning of the rainy season.

In regard to the propagation of Castilloa rubber trees, Dr. Olsson-Seffer strongly recommended planting the seeds at stake, in the open, instead of raising the seedlings in nurseries—a method which involves the labour and expense of transplanting, with its consequent check to the growth of the seedlings. Transplanting also incurs the risk of a considerable amount of loss, rendering necessary subsequent supplying. Planting at stake is the method now generally adopted by experienced planters. The seeds are planted on small hills, with about seven seeds (at a distance of 3 inches from each other) to each hill. The hills are at a distance of about 7 feet in rows 12 feet apart.

Planting in this manner allows for a high percentage of failure in germination, as well as destruction by various field pests. In the early stages of growth of the seedlings, weeding is frequently necessary, and at the same time weakly, mis-shaped, and over-crowded plants should be removed. It will be found that at least 50 per cent. of the young plants may be removed with advantage during the early stages of growth.

Dr. Olsson-Seffer recommends that thinning out should continue each year, until the number of trees has been reduced to about 800 per acre at the end of six years from sowing. In order to obtain the highest returns, it is advised that the 400 best trees should be selected as the permanent trees of the plantation, not to be touched before they have reached 26 to 28 inches in circumference at 3 feet from the ground. The remaining 400 trees may at six years old be tapped once, or twice if necessary after a short intermission, and then felled. At the end of the seventh year therefore, there would be 400 trees to the acre. Such a number would mean an average distance from tree to tree, each way, of about 10½ feet.

In regard to distance in planting, it is apparent that, provided the trees do not directly interfere with one another the closer they are planted the better. Dr. Olsson-Seffer pointed out that growth is impaired as soon as the roots of the trees touch and become intermatted. On the other hand, when Castilloa trees are planted widely apart their growth is stunted, and when the trees become older, their bark is exposed to the heat of the sun, and to the evaporating influence of winds. The result of this is, that the bark cracks, the latex vessels shrivel, and the yield of rubber is consequently reduced. Bearing these considerations in mind it appears obvious that the question of proper spacing is one which requires the exercise of considerable judgement, but that close planting in the first place and subsequent careful and gradual thinning as indicated above, is undoubtedly the best method to adopt in Castilloa rubber culture.

PLANTATION *VERSUS* WILD PARA RUBBER.

M. Lamy-Torrilhon, a well-known French rubber expert, recently contributed an article to the *Journal d'Agriculture Tropicale* on the relative qualities of rubber from the Brazilian forests, and that from the cultivated plantations of the East.

At present, as is pointed out, manufacturers show a preference for rubber from the wild trees. This, of course, is not due to any natural defect in the plantation product, but in the opinion of M. Lamy-Torrilhon, may be attributed to (1) the non-observance on the part of plantation owners of the system of curing recognized as the best in Brazil, and (2) the comparatively young age of the greater number of plantation trees. The first factor, it will be seen, is incidental, and may be remedied without great difficulty, while time will remove the second. There is no real reason why plantation rubber should not be equal in every respect to the product from the Brazilian forests.

M. Lamy-Torrilhon does not seem to be favourably impressed by the wet block process of preparation, but advocates the simultaneous smoking and coagulation of the latex.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of March :—

The month of March was specially marked in the drug market by a fall in the price of cocaine hydrochloride which had for some time been expected, and which, it was anticipated, would still go lower. Six shillings per oz. was the price at which the article was purchased at the beginning of the month, and at this date very large purchases were made. In the middle of the month, however, the price had risen to 6*s.* 5*d.*, and at the last auction on the 26th, 6*s.* 8*d.* was paid for 175-oz. contracts, and 7*s.* for 50-oz. purchases. It is said that the use of cocaine as an anaesthetic is declining, especially among dentists by whom it has hitherto been much used.

The dealings in other products have been of a purely normal character.

GINGER.

At the first spice auction on March 4, some 300 packages of Jamaica were offered, and 33 sold at 61*s.* for fair small washed, and 57*s.* 6*d.* to 58*s.* for ordinary small. Cochin and Calicut were in fair supply, but small sales only were made, small plump washed Cochin being held at 37*s.* 6*d.*, and medium bold limed Calicut at 43*s.* A week later prices had somewhat advanced, though the demand was small. Out of 180 packages of Jamaica offered only 15 were sold at 65*s.* for low medium, and 58*s.* for good common. At the auction on the 18th there was no Jamaica offered, but 17 bags of Calicut were put up, a few only of which were disposed of at 36*s.* for tips, fair cuttings being held at 38*s.* At the last spice sale on the 25th, the Jamaica offerings amounted to 420 packages, 17 only being sold at the following rates : 71*s.* for middling and 55*s.* per cwt for ordinary. Neither Cochin not Calicut was in demand.

NUTMEGS, MACE, AND PIMENTO.

A slight advance on previous rates in nutmegs was maintained at the first spice auction on March 4. On the 11th, a quiet tone prevailed at the sale, the offerings at which were unimportant, 28 bags of Singapore 80's being bought in at 7½*d.* per lb. On the 18th, 51 packages of West Indian realized the following prices : 4*d.* to 4¼*d.* for 129's to 131's ; 4¼*d.* to 4½*d.* for 102's to 115's ; 4½*d.* to 5*d.* for 92's to 97's ; 5½*d.* to 6*d.* for 76's to 83's, and 9*d.* for 67's. West Indian mace at the first auction was disposed of to the extent of 40 packages, 1*s.* 10*d.* per lb. being realized for fine pale, 1*s.* 4*d.* to 1*s.* 5*d.* for fair to good pale and reddish, while for fair to good red 1*s.* 3*d.* to 1*s.* 4*d.* was paid, and 10½*d.* to 1*s.* for broken. These prices were maintained to the close of the month. Of pimento there has been but a slow demand throughout the month, the prices varying from 2⅝*d.* to 2¾*d.*

ARROWROOT.

At the first spice auction on the 4th some 60 barrels of good manufacturing St. Vincent sold at 2½*d.* per lb. A week later 30 packages of St. Vincent were sold without reserve at 2*d.* to 2⅜*d.* for ordinary to good, and 3⅛*d.* for cases. One hundred cases of Natal were also offered and sales made at 3¾*d.* per lb. for sound, and 1¾*d.* to 2*d.* for an 'off colour' quality. At the last sale on the 25th, as many as 200 barrels of St. Vincent were offered, the whole of which was bought in.

SARSAPARILLA.

At the beginning of the month it was stated that there was a dearth in genuine grey Jamaica, and that only a few bales of native red were to be found here and there. At the drug auction on the 12th, 18 bales of grey Jamaica had arrived, and were sold at advanced prices over previous sales, 1*s.* 10*d.* to 2*s.* being paid for part coarse, and little dark to good grey. Six bales of native Jamaica were disposed of at from 1*s.* to 1*s.* 2*d.* for ordinary pale and red mixed with yellow. One bale of deep red native Jamaica realized 1*s.* 3*d.* per lb., and 10 bales of Honduras were bought in at from 2*s.* 1*d.* to 2*s.* 4*d.* per lb. A fortnight later fair red, partly sea-damaged, fetched 1*s.* 2*d.* to 1*s.* 3*d.*, dull red and yellow mixed, also partly sea-damaged, 1*s.* to 1*s.* 2*d.*, and common mixed dull red and yellow, partly damaged, sold at 9*d.* to 11½*d.* per lb.

KOLA, OIL OF LIME, ANNATTO, QUILLAIA, ETC.

At the first sale of the month 40 packages of kola nuts were offered and 15 sold : 10 bags of dried, bold Grenada at 2¼*d.*, and 5 bags of mouldy dried Jamaica at 2⅛*d.* per lb. On the 25th, 36 bags of small and medium darkish, dried West Indian were offered and all were bought in at 2½*d.* per lb. On the same date 3 cases of West Indian oil of lime were sold at 1*s.* 9*d.* per lb. In the middle of the month some 35 bags of good bright Ceylon annatto sold at from 3¾*d.* to 4*d.* per lb. A consignment of 305 bales of Quillaia bark was reported as having arrived in Liverpool from Valparaiso in the early part of the month, but details of sale had not come to hand at the time of writing. Sweet West Indian distilled oil of oranges was quoted in the middle of the month at 7*s.* 6*d.*, and bitter at 5*s.* 6*d.* per lb. There have been small sales of good bright Tripoli strip orange peel at 8½*d.* per lb.; the market has been firm in chillies, good fair but stalky Mombassa being held at 24*s.*

MOTOR POWER IN AGRICULTURAL OPERATIONS.

In a letter to the Imperial Commissioner of Agriculture, Dr. Francis Watts has pointed out that the rapid development of mechanical tillage in Antigua (see *Agricultural News*, Vol. VI, p. 337) has naturally resulted in an increased demand for draught power for the agricultural implements used. Mules are reported to be scarce and dear, and attention has therefore been drawn to the possibility of the introduction of motor power for the purpose.

In England and America motors are used to some extent in agricultural operations, and it is possible that if a maker sent out a machine with a skilled man to manage it, for the purpose of demonstration, they might be found suitable for use in these islands. One of the most prominent among the English firms manufacturing agricultural motors is the Ivel Agricultural Motors, Limited, London. Another firm is Messrs. H. P. Sanderson & Co., of Bedford, who report that they are sending motors to several British colonies, e.g., the Sudan, British East Africa, South Australia, etc., as well as to many foreign countries. The latter firm give particulars of two motors of 36 and 20 horse power respectively, manufactured by them. The former will haul 4 to 5 tons, and in England will plough ¾ acre per hour. The latter will haul 2 to 3 tons and plough ½ acre per hour. They will also drive machinery. The price of the former is £360, of the latter, £290.

Dr. Watts points out that there is a good field for demonstration in Antigua, and the machines might also be tried at Barbados and St. Kitt's.

MARKET REPORTS.

London,—April 28, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., April 14, 1908; Messrs. E. A. de Pass & Co., April 17, 1908.

Arrowroot—2¼*d.* to 2⅜*d.*
Balata—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8 per lb.
Bees'-wax—Good quality, £7 15*s.* to £7 17*s.* 6*d.* per cwt.
Cacao—Trinidad, 74/- to 88/- per cwt.; Grenada, 74/- to 79/- per cwt.
Coffee—Santos, 28*s.* 4½*d.*: Jamaica, 37/- to 57/- per cwt.
Copra—West Indian, £16 10*s.* per ton.
Cotton—St. Vincent, 15*d.* to 16*d.*; Barbados, 15*d.* to 16½*d.*; St. Kitt's, 15*d.* to 16½*d.*; Montserrat, 16*d.* to 16½*d.* per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—4/6 to 5/- per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—14/- to 16/- per box.
  Oranges—Jamaica, 6/- to 7/- per box.
Fustic—£3 10*s.* to £4 10*s.* per ton.
Honey—19*s.* to 34*s.* per cwt.
Isinglass—West India lump, 1/9 to 1/11 per lb.; cake, no quotations.
Lime Juice—Raw, 1/2 to 1/4 per gallon; concentrated, £11 12*s.* 6*d.* per cask of 108 gallons; Distilled oil, 1/9 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10*s.* to £4 5*s.* per ton; roots, £2 10*s.* to £3 10*s.* per ton.
Mace—1/2 to 1/3 per lb.
Nutmegs—68's to 69's, 7*d.* to 9*d.*; 76's, 7*d.*; 105's, 4¼*d.*; 111's to 115's, 3¾*d.* to 4¼*d.*; 121's, 3½*d.*; 143's, 4*d.*
Pimento—Quiet; no quotations.
Rum—Jamaica, 3/- to 3/3; Demerara, 1/3 to 1/4½ per gallon; Trinidad, no quotations.
Sugar—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 16*s.* 1*d.*; Molasses, 14/- to 14/6.

New York,—April 17, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 16c. to 20c.; Grenada, 16½c. to 17¼c.; Trinidad, 16½c. to 17½c.; Jamaica, 14c. to 14½c. per lb.
Cocoa-nuts—Jamaica, select, $26·00 to $28·00; culls, $15·00: Trinidad, $25·00 to $27·00; culls, $15·00 to $16·00 per M.
Coffee—Jamaica, good washed, 9½c. to 11½c.; good ordinary, 7c. to 8¾c. per lb.
Ginger—12½c. to 13c. per lb.
Goat Skins—Jamaica, 55c.; St. Thomas, St. Croix, St. Kitt's, 48c. to 54c., dry flint; 30c. to 42c., dry salted.
Grape Fruit—Jamaicas, $1·50 to $2·75 per box and $3·50 to $5·00 per barrel.
Limes—Dominica, $7·00 to $7·50 per barrel.
Mace—29c. to 32c. per lb.
Nutmegs—110's, 8½c. to 9½c. per lb.
Oranges—Jamaica, $2·75 to $3·25 per barrel.
Pimento—4⅜c. to 4½c per lb.
Sugar—Centrifugals, 96°, 4·36c.; Muscovados, 89°, 3·86c.; Molasses, 89°, 3·61c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., May 5, 1908; Messrs. T. S. Garraway & Co., May 11, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $14·00 to $15·00 per 100 lb.
Cocoa-nuts—$14·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·25 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—Choice, 15c.; Fancy, 17c. per gallon.
Onions—Madeira, $2·10 to $2·50 per 100 lb.
Potatos, English—$2·75 per 160 lb.
Peas—Split, $6·50; Canada, $3·30 per bag.
Rice—Demerara, $6·10 (180 lb.); Patna, $4·00; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89°, $2·30 per 100 lb., package included; Dark crystals, $2·75; Centrifugals, $2·30 to $2·40 per 100 lb.

British Guiana,—May 2, 1908, Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $9·50 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 16c. to 18c. per lb.
Cassava—No stock.
Cassava Starch—$7·56 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 12c. to 13c.; Jamaica, 12c. per lb.
Dhal—$5·50 per bag of 168 lb.
Eddos—84c. per barrel.
Molasses—Yellow, 19c.; Dark, no quotations.
Onions—Madeira, 3c. to 3½c.; Lisbon, 3c. to 3½c.; Dutch, 3c. per lb.
Plantains—20c. to 64c. per bunch.
Potatos,—English, $2·40 to $2·50 per barrel.
Potatos, Sweet—Barbados, $1·44 per bag.
Rice—Ballam, $6·25 to $6·40; Creole, $5·25 for good; Seeta, $6·00 per bag.
Split Peas—$6·00 to $6·10 per bag (210 lb.); Lisbon, $4·59.
Tannias—$2·40 per bag.
Yams—White, $2·40; Buck, $2·40 per bag.
Sugar—Dark crystals, $2·70 to $3·00; Yellow, $3·00 to $3·10; White, $3·60 to $3·70; Molasses, $1·80 to $2·00 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
——— **Cordwood**—$2·40 to $2·64 per ton.

Trinidad,—May 2, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$15·50 to $16·25 per fanega.
Cocoa-nuts—$24·00 per M., f.o.b.
Cocoa-nut Oil—70c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·40 to $2·65 per 100 lb.
Dhal—$4·60 to $4·80 per 2-bushel bag.
Onions—$2·50 to $3·00 per 100 lb. (retail).
Potatos, English—$2·00 to $2·25 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

AGRICULTURAL NEWS.

A FORTNIGHTLY REVIEW
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Black Blight.

THE presence of 'black blight,' as it is termed, is more or less in evidence on different kinds of vegetation in practically all the West Indian islands. It has, however, attracted most attention in Grenada, where during recent years it has been prevalent on a number of trees and plants. Its occurrence, in a more or less intermittent manner, is also noticeable at Dominica, Jamaica, St. Kitt's-Nevis, Monserrat, and Barbados, and more recently complaints have been received of the spread of black blight at St. Vincent and St. Lucia.

The unsightly and soot-like appearance of the leaves and branches of the affected trees which are covered with the black, velvety mycelium of the fungus accounts for the name 'black blight'. It must be remembered, however, that the damage done by the fungus itself (which is a species of the genus *Capnodium*), is comparatively insignificant, the injury to the tree being primarily due to scale insects with which an attack of black blight is always associated. The attacks of the scale insects lower the vitality of the trees by sucking the juices from the leaves and young shoots. In cases where the fungus growth has developed to such an extent as almost to cover the leaves, starch formation is probably interfered with, as a result of the exclusion of sunlight; but this is the limit of the action of the fungus upon the plant, since it is not parasitic in its habit, but occurs in connexion with the scales, as it finds nutriment and favourable conditions for growth in the secretions formed by these insects.

The chief trees on which black blight occurs as a pest in the West Indies are the orange, lime, mango, breadfruit, sapodilla, guava, avocado pear, hibiscus, Castilloa rubber, and coffee. Many other trees are affected in a minor degree. Fortunately, cacao is not susceptible to attacks from scales, but in one or two instances, where the trees were growing under unfavourable conditions, black blight has been known to occur on cacao in Grenada and Trinidad.

Prominent among the scale insects responsible for the occurrence of black blight may be mentioned the various shield scales (*Lecanium* spp.), the glassy star scale (*Vinsonia stellifera*), the orange mussel scale (*Mytilaspis citricola*), the mealy shield scale (*Protopulvinaria pyriformis*), and the black line scale (*Ischnaspis filiformis*). In addition there are a great number of scale insects occurring on various trees and plants in the West Indies, some of which have probably not yet been identified.

It is evident that any measures designed to prevent or control the spread of black blight must be directed against the scale insects. These pests are well known in most parts of the world, and the total loss caused by their depredations on fruit and vegetable crops reaches an enormous figure annually. Broadly speaking, there are three recognized methods of keeping scale insects in check, and these have been adopted with more or less success in different countries.

The first method consists in encouraging, and if necessary, introducing new species of the natural insect enemies of the scales, of which there are many, both predaceous and parasitic. Chief among the former are various species of lady-birds, while the larvae of the lace-winged flies (*Chrysopa* spp.) also do good service in this direction. The parasitic enemies of the scales are chiefly minute hymenopterous insects. The presence of these latter is not always easy to recognize, but if on examination, the common black scale is found to be pierced with a minute round hole, it is a safe indication that parasitization has taken place. At least three species of scale insects occur in Grenada, which are also prevalent in California, and which, in the latter country, are parasitized by the hymenopterous insect *Scutellista cyanea*. Reports from California state that the introduction of *S. cyanea* from South Africa for parasitization purposes has been attended with a very gratifying measure of success. Attempts are being made to introduce this valuable insect into Barbados, and if these efforts are successful there should be a sufficient number available in a short time for introduction into the other islands. Where the natural insect enemies do not exist locally, however, their introduction and acclimatization is necessarily a protracted and expensive business. If the necessary funds were available, in course of years reasonable hopes might be entertained as to the ultimate development of this means of controlling the scales.

A second method for keeping the scale insects in check consists in spraying them with some insecticide. This forms the best method of direct attack in the West Indies, and one which should be employed whenever practicable, and where the cost of the operation is not prohibitory. Details as regards the composition and use of mixtures that have been found useful for spraying purposes by officers of the Imperial Department of Agriculture, will be found in Pamphlet No. 7 of the Series issued by the Imperial Department, entitled 'Scale Insects of the Lesser Antilles' (Part I), where also the chief scale insects prevalent in the West Indies are described and figured. A knap-sack sprayer will usually be found most convenient for ordinary estate purposes, more especially in cases where the ground is rough and uneven. For trees of 20 to 30 feet high, however, a sprayer such as the 'Fruitall' type will be necessary. Trees should be pruned before spraying and all useless branches lopped off. By this means there will be a better chance of the liquid reaching all parts of the trees. In dealing with large trees badly affected it has been recommended that they should be lopped as closely as possible, and the cuts tarred over, the whole being afterwards thoroughly coated with a good lime wash. In connexion with spraying, it is important to remember that clean cultivation is necessary, and all useless trees and plants near by that are infested with black blight should be cut down and burned, since the pest is likely to spread from such vegetation to cultivated trees.

In an island so badly infested with black blight as is the case at Grenada, it is practically impossible completely to exterminate the scale insects without the expenditure of a sum of money which is not at present warranted by the actual amount of damage caused by these pests. Under the circumstances, it is all the more incumbent upon individual planters to keep the blight in check on their own estates by care in the exercise of clean cultivation, and by the use of insecticides wherever spraying is practicable.

In cases where trees growing along road sides or on waste lands which are not under proper control are affected with black blight, the Government should under take theduty of looking after and controlling the pest, and thecost of doing so should be met from public funds. The first operations should always be started to windwardof the infested areas, in order to prevent the spread of scale insects to trees already treated.

In California, the method of fumigating affected trees, over which a moveable tent has first been erected, has been adopted with considerable success by many orange growers. This device, however, is probably not suitable for general adoption in the West Indies.

SUGAR INDUSTRY.

Seedling Canes in Jamaica.

The Barbados seedling canes B. 208 and B. 147, and also the Demerara cane D. 95, are reported to have given very good results in Jamaica during the past season, their powers of withstanding drought being especially noticeable.

The Jamaica correspondent of the *Louisiana Planter* refers to these canes in a letter published in the *Planter* of May 2, and states that the owner of one estate who was growing several good varieties of cane regarded B. 208 as the best of all on account of the power it had shown in resisting the severe drought. Another estate owner is quoted as having expressed the opinion that both B. 208 and B. 147, when grown for stock food, are altogether superior to native Jamaica canes.

At Mona estate as the result of three separate experiments, two of ratoons and one of plants, B. 208 grew more luxuriantly than any other cane: it also gave the best crushing results and the richest juice, with an increase of 50 per cent. over the ordinary estate cane yield. Its superiority as second ratoons, under conditions of drought, has also been well demonstrated. It gave an increase of 45 per cent. in sugar over the Jamaica White Transparent cane. The cane D. 95 showed up well under similar conditions. Equally encouraging reports on the behaviour of these seedlings were obtained from other estates. At Llandovery, in St. Ann, 3 acres of B. 208 were mentioned as having stood the drought well, while many of the ordinary estate canes died out entirely.

In consequence of the above results many planters are reported to be planting larger areas of the seedling canes in question.

Cuban Sugar Crop.

Reports from Cuba continue to speak of the shortage in the 1907-8 sugar crop, although this deficiency is not now believed to be so great as was at one time anticipated. It is stated that neither the cane growers nor the factory owners will derive much benefit from the prevailing higher prices since the former sold their canes to the factory at a low contract price at the beginning of the season, while the factory owners were in many cases obliged to borrow money from the banks at a high rate of interest. The following extract from the report, dated April 26 last, of the Cuban correspondent of the *American Sugar Industry and Beet Sugar Gazette* gives some idea of the present situation in the island:—

> One million tons are now regarded as the extent of the present season's sugar crop, though there are many who still maintain that the output will be lower. The different mills throughout the island are rapidly concluding their grindings and almost without exception the returns are less than calculated. The disastrous drought has continued without interruption, and while it has facilitated grinding it has reduced the available cane. The high prices at which sugar is now quoted has done much to reconcile all to the shortness of the crop. Fears are now to be entertained regarding the harvest of next year. The drought which reduced the output this year still continues, and the result is very bad upon the new plantings. A few rains have fallen in various parts of the island, but they have been of little good to the sugar districts. The plantings made before Christmas have already died for want of moisture in many localities, while plantings of this spring seem likely to have the same fate. The outlook at this time is certainly far worse than it was at the same time last season. Had rains come at an opportune time this year the harvest would have been far better, despite last year's drought. The rains did not fall, however, nor has it fallen yet, and for this reason the prospect is gloomy. The resources of the Cuban soil are so great, however, that wonders may yet happen if favourable weather sets in at any time soon.

Capacity of Sugar Factories and Economy in Production.

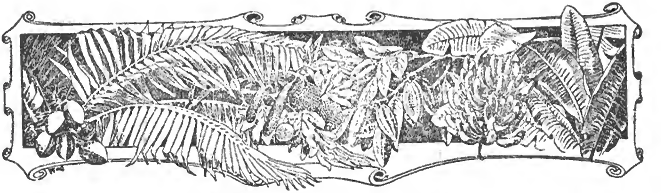
The accompanying note on the relationship between the capacity of sugar factories and the economy of production is taken from the *American Sugar Industry and Beet Sugar Gazette* (May 1908):—

> Since 1900 the tendency has been, in Porto Rico as in Cuba and Hawaii, to increase the capacity of the plants in order to secure more economical results. Experience has shown that there is a limit to the capacity of such plants, at least in Porto Rico, and that it would pay better to have, for instance, three centrals of 1,000 tons capacity each, in different places, than one factory of a capacity of 3,000 tons. The only saving in a very large factory is on the labour expenses, there being no expense for fuel in a well managed plant of any size, and most of the other items being the same in either case per ton of cane. The saving in labour could not reach 20c. per ton in the larger factory, and this would be largely neutralized by the necessity of going much further for the supply of cane. In fact the actual profit per ton of cane in the big Porto Rican Centrals has been, so far, much smaller than the profit in the well situated and managed factories which have a capacity of no more than 700 to 900 tons.

Evaporation from Sugar-cane Plants.

Some idea of the very large amount of water which, over any given area, is daily taken from the soil and evaporated into the air by the sugar-cane crop, may be obtained from the following note, which appeared in the *Louisiana Planter* of March 28 last:—

> Professor Z. Kamerling, of the West Java Sugar Experiment Station, has been determining the amount of water evaporated by the sugar-cane under different conditions. In one instance, with well developed canes, the quantity of water evaporated during twenty-four hours, when the plants were exposed to the direct rays of the sun only during the afternoon, averaged from 183 to 292 grammes per plant. In another instance, a plant of about six weeks' growth, and exposed to the sun during the entire day, evaporated 350 grammes in twenty-four hours. The average result with nine different plants, five months old, showed an evaporation of $1\frac{3}{4}$ litres [1 litre is equal to about $1\frac{3}{4}$ pints] of water per day. It is stated that the factors most generally influencing this activity of the plant are the distribution of the roots, the physical condition of the soil, soil moisture content, leaf temperature and sunlight conditions.



WEST INDIAN FRUIT.

POSSIBILITIES OF A FRUIT-PRESERVING INDUSTRY.

An article in the *Journal* of the British Guiana Board of Agriculture draws attention to the abundance of fruit which prevails in the colony at certain seasons of the year, and the possibilities of profit which exist if local enterprise were forthcoming to prepare this fruit and put it on the market in the form of a regular supply of preserves. At present, it appears, little or nothing is done in this way, despite the existence of a local market, now supplied by imported preserves. The mango, guava, Otaheite gooseberry, hog-plum, as well as the carambola, cherry, sorrel, and Seville orange are mentioned as fruits occurring in quantity in the colony, and which might form the raw material for a preserving industry. With the experience gained in catering for the local demand, something might later be done to develop an export trade. At local exhibitions held in British Guiana prizes are regularly offered for jams and jellies, but this amount of encouragement has not so far produced any very marked result. A course of practical demonstration in the preparation and putting up of preserves at various centres in the colony might possibly be serviceable in this direction.

BANANA INDUSTRY IN DUTCH GUIANA.

From an article 'Planting News in Surinam' contributed to the April number of *Tropical Life* by Dr. Van Hall, Director of Agriculture in Dutch Guiana, the accompanying interesting paragraph dealing with the establishment of the banana industry has been taken:—

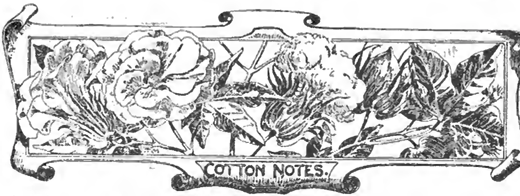
One of the most important steps undertaken by the Government has been the establishment of the banana industry, to try and compensate the colony for the loss occasioned by the cacao disease, and to afford help in carrying on the cacao plantations. To bring this about, an Ordinance was passed to enable the planters to obtain financial assistance from the Government for carrying on the cultivation of bananas. The Government advance was at the rate of about £30 per hectare [1 hectare = 2½ acres] for the first year of planting, and £15 for each following year, the amount to be refunded from the proceeds of the crop. By last April, about a thousand hectares had been planted, and since then another 500 have probably been added to this. With so large an area regular shipments of substantial dimensions are looked for, and a contract has been entered into with the United Fruit Company to buy all the bunches produced. Their transport is to be undertaken by four newly built fruit steamers of the Dutch West Indian Mail line, and the first shipment was arranged to be made on March 15, 1908. In spite of an unusually heavy rainfall last year (in April alone about 27 inches were recorded), the industry looks very promising, and the growth of the plants has been most satisfactory.

PRESERVATION OF RED SORREL FRUITS.

In the course of an article in the *Natal Agricultural Journal* entitled 'The Roselle or Jamaica Sorrel' (*Hibiscus sabdariffa*), so well known in the West Indies, the following note is given on the preservation of the fruits:—

The roselle is well adapted for jam-making, giving a palatable, easily-kept product if put up in earthenware or glass. Unfortunately the fruits contain an acid principle which precludes them being put up as preserves in ordinary tin-ware, and hence some failures have been experienced in this respect. For pickles the fruit is well adapted, and it makes an excellent condiment.

It has been found that the best method of handling the fruit is to dry it after the removal of the seed pod. The dried fruit has been kept in jars and tins for two or three years in good order. The first preparation that is necessary is the cutting off of the stem of the fruit, and the basal end of the calyx [the calyx is the red-coloured edible portion] to where the seed pod is united with the calyx, when a gentle pressure with the fingers will force out the seed pod. Then the fruit should be placed in some roomy, airy position (not necessarily in the sun), in trays or on sheets on the floor, allowing as much air to pass through and over the fruit as possible. In a few days all superfluous moisture will have evaporated, and the dried article can be packed away in jars. By this means roselles can be had in good condition all the year round. All that is needful, when required for use for jam, tarts, etc. is to take the quantity necessary and pour over the fruit a little water, when it will absorb the moisture and resolve itself into apparently fresh fruit. The large grower has in this method a certain way of keeping such surplus fruit as may not be in immediate demand, or which, on account of low ruling prices, he may not wish at the moment to put on the market. Fruit put up in this form might be successfully exported to the London market.


COTTON NOTES.

SEA ISLAND COTTON MARKET.

In their report of May 2 last, on the sales of cotton from the Sea Islands, Messrs. Henry W. Frost & Co., of Charleston, write:—

> The sales for the week consisted of a small planters' crop of 15 bales for France. There was some further enquiry for crops, but at lower prices than factors were willing to accept.

On May 9, Messrs. Frost write:—

> The sales for the past week consisted of stained and tinged cotton, together with a small lot slightly inferior in class, at prices ranging from 15c. and above. The principal buying was on account of French spinners, the exports of the week being 267 bales to Havre. There is some enquiry for planters' crop lots but the prices bid are much below the present views of factors and planters, and consequently no sales are reported.

WEST INDIAN COTTON AT LIVERPOOL.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of May 11 last, in reference to the sales of West Indian Sea Island cotton on the Liverpool market:—

> Since our last report a better business has been done in West Indian Sea Island Cotton, sales of about 600 bales having been reported, but late business will increase that figure to about 1,000 bales. The business has been chiefly in cotton about 14½*d.*, including Anguilla, Antigua, Barbados, Barbuda, Montserrat, Nevis, St Croix, St. Martin and Virgin Islands. Several small lots of stains have been sold at from 6*d.* to 9*d.* per lb.
>
> Prices are steadier, but we understand that the chief buyers are purchasing for stock.
>
> Many planters appear to have ignored the fact that owing to the combination of most excellent trade conditions and a short crop from Georgia and Florida, last season's prices were quite exceptional, and this season they do not appreciate the acute trade depression which has followed the financial panic of October last in New York. All raw material has suffered in price, and the depression has probably been most acute in cotton.
>
> All cotton has depreciated enormously; Egyptian has fallen from 10⅜*d.* to 7¼*d.*, and many Egyptian houses have suspended in consequence.
>
> Orders for yarns have been cancelled wholesale, and spinners have not had the courage to buy cotton to stock. It is the worst reaction we have known for many years.
>
> At present prices, or a shade under, we think that West Indian cotton would be rapidly absorbed in a normal season.

ST. VINCENT CENTRAL COTTON FACTORY.

The *Annual Report* (1906-7) on St. Vincent, just to hand, contains the following note on the Central Cotton Factory of the island:—

> The Central Cotton Ginnery, erected in 1903-4, still remains under the successful management of the officers of the Imperial Department of Agriculture. The rate charged for ginning and baling is fixed at 1*d.* per lb., and at this low rate a considerable profit results after paying for labour and other outgoings. The lint again secured the highest price in the English market, which fact is in a great measure due to the care and expert supervision bestowed on the ginning and preparation of the produce for export.
>
> The disintegrator for crushing cotton seed was not used, and practically all of the seed produced locally was sent to Barbados for sale. It is much to be regretted that this should be the case, but it is difficult to see how things can be altered until effective oil-extraction machinery has been erected in the colony.

COTTON EXPORTS OF ST. VINCENT.

Mr. W. N. Sands, Agricultural Superintendent of St. Vincent, has forwarded the following table showing the quantity and value of the cotton exported from St. Vincent each year since 1903-4. The figures are for the period from May 1 to April 30, but in the case of 1907-8 they cover only the period from May 1, 1907, to March 31, 1908, since the figures for the shipments of last April are not yet available:—

Year.	Sea Island cotton. lb.	Estimated value. £.	Total exports Sea Island and Marie Galante. lb.	Total estimated value £.
1903-4	Not known.	...	43,392	794
1904-5	77,814	3,890	126,178	4,494
1905-6	121,174	6,059	138,150	7,674
1906-7	225,632	16,922	263,036	18,169
1907-8	388,833	29,162	427,819	30,787
Total ...	813,453 lb.	£56,033	998,575 lb.	£61,918

CONFERENCE OF COTTON GROWERS AT BARBADOS.

A Conference of the cotton growers of Barbados was held on May 15, in the Lecture Hall of the Free Library, Bridgetown, under the auspices of the Barbados General Agricultural Society, for the purpose of enabling planters and others to take stock of the present situation in regard to the Cotton Industry. The Hon'ble. Sir Daniel Morris, K.C.M.G., was present with several officers of his Department. The Chair was occupied by Hon. F. J. Clarke, C.M.G., Speaker of the House of Assembly and President of the Agricultural Society.

Sir Daniel Morris, in the introductory speech with which he opened the meeting, expressed his conviction that the conferences between scientific officers engaged in agricultural work and members of the planting community, inasmuch as they afforded an opportunity for the mutual exchange of ideas respecting the treatment of crops on a large scale, were calculated to be of benefit to all concerned. The present Conference which had been arranged on his suggestion by the Agricultural Society, was intended to deal with the present circumstances and prospects of the Cotton Industry. This industry was started in 1903 with only 16 acres under cultivation. The value of the crop that year was only a little over £300. Last year the area under cultivation was 5,000 acres, and the value of the lint and seed reached £76,876.

According to figures supplied by Mr. J. R. Bovell, Agricultural Superintendent of the island, this year the total area under cultivation in cotton is 6,935 acres and the value of lint and seed, in spite of low prices, is estimated not to fall short of £100,000. It is evident that a new industry that has shown such remarkable progress within so short a time is deserving of the fullest consideration by those interested in the welfare of this island.

With a view of placing cotton growers in a fovourable position for carrying on the industry, a complete little handbook (*A.B.C. of Cotton Planting*) has been placed within the reach of everyone. Further, the services of the officers of the Department—the Entomologist and the Mycologist—as well as those of Mr. Bovell, are always at hand in cases of difficulty, therefore no one should be at a loss as to what ought to be done in cases of emergency.

We have already solved a good many problems which confronted us when starting the industry. For instance, we are now pretty well agreed that in the black-soil districts of Barbados, the best time to plant cotton is from the beginning of July to the middle of August; whereas, on the higher lands in the red-soil districts, the best planting season is from the beginning of August to the middle of September.

In regard to planting distances, there is practically little to add to what is already stated in the *A.B.C. of Cotton Planting*, p. 15. In a moderately poor soil the distances recommended are 5 feet between the rows and 20 inches apart in the rows. In good land or land well manured, the plants may be set wider apart, say, 6 feet between the rows with the plants 18 inches apart in the rows.

In regard to the preparation of the land and manuring, Mr. Bovell and others will offer suggestions based on experience during the last five years. These I commend to your favourable consideration.

Seed selection is possibly one of the most important matters requiring attention just now. The cotton plant is of so plastic a character, and it is so easy to influence it by skilful methods of seed selection, that it is within our power to raise plants suited to almost any condition of soil and climate, which at the same time produce exactly the character of lint required by the spinners. It should also be within our power to produce plants more or less immure to several of the diseases from which they now suffer. A striking example of what is possible to be done in this direction is that of a planter at Barbados. Last year he shipped 7 bales of cotton raised originally from a single plant. This cotton has been pronounced at Liverpool *the most serviceable class ever produced in the West Indies*. It is further stated that during the last four plantings, it gave heavier yields than any other variety. This remarkable result is within reach of everyone who cares to devote close attention to seed selection.

As you are aware, owing to the general depression in trade, prices are at present lower than at any time during the past five years. On the other hand, on looking over the average prices of fine Sea Island cotton during the last twenty years (published in the *Agricultural News*, Vol. V, p. 279) it will be observed that ten years ago prices were lower than they are now, but they gradually improved until last year, they reached the maximum of more than 20*d*. per lb. When trade improves there is no doubt that the price of Sea Island cotton will also improve. In any case, at present Sea Island cotton sells at three times the value of Upland cotton, so if we are to grow cotton at all, a good, hardy and prolific variety of Sea Island cotton is likely to suit these Colonies better than any other.

Professor d'Albuquerque addressed the meeting on the subject of manuring Sea Island cotton. As stated in the *A.B.C. of Cotton Planting*, experiments carried out under the Imperial Department of Agriculture showed that the best results were obtained by the application of a mixture consisting of 300 lb. high grade superphosphate, 40 lb. good sulphate of potash, and 100 lb. good sulphate of ammonia per acre. The plots which received the above mixture showed a profit of $12·99 per acre. These results are similar to those obtained from corresponding experiments previously carried out in the United States.

The necessity of keeping up the supply of humus in the soils of Barbados was then referred to, and it was mentioned that many of the soils of the island, which are naturally thin, show a humus content of no more than from 1 to 3 per cent., and this notwithstanding the fact that sugar-cane cultivation, with its regular return of large amounts of organic matter to the soil, had been carried out on these lands for such a long period. The growth of sugar-cane was undoubtedly the best means of providing the necessary humus, which was but imperfectly supplied by cotton-cake-meal or artificial organic manures, such as tankage, dried blood, etc. In view of the fact that cotton did not return anything like so much humus to the soil, planters in Barbados would be well advised to regard cotton as one crop in a rotation, of which the sugar-cane formed an important part.

In connexion with the use of cotton-cake-meal for manurial purposes, it was mentioned that, taking as a basis the average results of ten analyses of Barbados cotton-cake (undecorticated), 1,000 lb. of such a substance, applied directly to the land, would yield about the same amount of nitrogen as that given by 200 lb. sulphate of ammonia, together with about 50 lb. phosphate of lime, and potash equal to 30 lb. sulphate of potash. It was pointed out, however, that the most economical method of using cotton-cake-meal was to feed it to stock. With care, about 60 or 70 per cent. of the fertilizing constituents could be saved in the manure, and in that state they were in a much more readily available condition than in the original cotton-cake-meal.

In conclusion Professor d'Albuquerque made brief reference to the method of disinfecting cotton seed by the use of a solution of corrosive sublimate. Experiments had shown that in consequence of the absorption of the corrosive sublimate by the seed, and also by the wood of the vessel, it was necessary, in order to ensure satisfactory results, to prepare the solution only just before it is required, and to use it for one lot of seed only.

Mr. J. R. Bovell, Agricultural Superintendent of Barbados, read a paper in which he dealt with the preparation of the land for cotton, the sowing and cultivation of the crop, and the methods followed in the cotton seed selection work carried on in Barbados. In regard to the selection of land for cotton, Mr. Bovell stated, it would appear that all parts of the island, with the exception perhaps of some of the very heavy clay soils in the Scotland district, were suitable for growing the crop. No hard and fast rules could be laid down as to the amount of cultivation required, but it was essential in all cases that the land should be got into proper tilth some time before the seed is to be sown. Land that had previously been planted in some crop such as sweet potatos would naturally not require so much tillage preparatory to cotton as a field from which a crop of second ratoons had recently been reaped. Similarly, so large a quantity of manure would probably not be needed by a cotton crop following plant canes which had been well manured as where the cotton came after a crop of second ratoons.

The results that have so far been obtained indicate that the best time for planting cotton seed in the black-soil districts of Barbados is from the beginning of June or middle of July to the middle of August, and in the red-soil districts of the island from the beginning of August to the middle of September. Occasionally, cotton planted out of season has given good results, but only in exceptional cases. Under no circumstances should more than one plant be allowed to grow at each hole.

About 6 lb. of seed was mentioned as the quantity required per acre under the ordinary circumstances of planting (with distances of 5 feet between the rows, and 20 inches from plant to plant in the rows, and also when the rows are 6 feet apart, and the plants are at a distance of 18 inches from each other in the rows). If the seed is of good germinating power, four seeds should be planted at each hole, about an inch deep. Later, the plants will be reduced to one at each hole, the strongest naturally being the one left.

One of the chief points in the after-cultivation of the crop consists in keeping the cotton plants free from weeds. As the growth of the crop advances, this work should be done by hand, since in weeding with a hoe there is a danger of bruising the plants, and red maggots are frequently found in such bruises later on.

When the cotton has been gathered it is most important that the different qualities should be sorted from each other, and that any bits of leaf, stalks, etc., be removed from the lint. If necessary the cotton should be whipped to remove adhering dirt or sand, and it should be sunned for at least a day, being afterwards bulked for about four to six weeks, to allow some of the oil in the seeds to be absorbed by the fibres. This causes them to be silky and lustrous.

Mr. Bovell then dwelt upon the great importance of seed selection in connexion with Sea Island cotton cultivation, and gave a detailed account of the methods followed in the cotton seed selection work carried on at Barbados under the Imperial Department of Agriculture. The characteristics of the plant taken into account in the selection work were the productivity or total yield, the quality of the lint, resistance of the plant to insect pests and fungoid diseases, and the habit of the plant. Some two or three years ago, three plants were selected on a certain estate at Barbados, and the owner recently shipped to England 7 bales of cotton, the progeny of one of these plants. Messrs. Wolstenholme and Holland, in their report on the shipment, stated that it was the most serviceable class of cotton that had ever been received from the West Indies.

A summary of the remaining papers read at the Conference, together with Sir Daniel Morris' concluding address, will be given in the next issue of the *Agricultural News*.

CROWN LANDS IN ST. VINCENT.

The following note giving particulars of the grants of Crown and other lands in St. Vincent made during 1906-7, appears in the *Annual Report* on the island for that year :—

The price of ordinary Crown land is £1 per acre for cash, and £2 if paid in instalments. A certain area is rented out in small lots at 6*s*. 3*d*. an acre. The law governing the disposition and administration of these lands was consolidated and simplified during the year under review.

The amount of Crown land proper granted during 1906-7 was 253 acres, the number of grants issued being fifty-five, as against forty-seven in the previous year ; while of eruption lands (the latter being the estates acquired from the Eruption Fund in 1902 for location of refugees, on which, however, there were numerous tenants found, many of whom have since acquired their holdings) grants were issued to 131 persons, of which thirty-four were for small lots and ninety-seven for house-spots.

The revenue from sales and rental of Crown lands, not including eruption estates, was £407, as against £444 in the previous year: whilst the revenue from the eruption lands aggregated £233, as against £208 in the previous year.

COFFEE CULTURE IN SURINAM.

Dr. Van Hall, Director of Agriculture at Paramaribo, in the course of a brief article on present conditions in Dutch Guiana, contributed to *Tropical Life* for April last, writes as follows in regard to efforts that are being made to re-introduce the cultivation of Surinam coffee into the colony :—

In order to wean the small proprietors of the colony from being wholly dependent on cacao culture, a large number of coffee seedlings have been sold to them, so as to encourage them as much as possible in again taking up the old Surinam coffee cultivation, so prominent in former years. The variety is a kind of *Coffea arabica*, yielding what was known on the Amsterdam market as the 'blue bean.' At one time this was a very favourite sort, but after the abolition of slavery it was no longer a paying crop, and so the cultivation was abandoned. If, however, the small proprietors continue to persevere with its cultivation in the near future as well as they have done in the past ten years, then Surinam coffee will again make its appearance on the European markets.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The prevalence of black blight, usually attendant upon attacks of scale insects, is discussed in the editorial, where some particulars as to the recognized methods of controlling the scales will be found.

The seedling canes B. 208, B. 147 and D. 95 have shown remarkable drought-resisting powers in Jamaica. Drought still continues in Cuba, and plantings for next year's crop are being interfered with (p. 163).

The first shipment of bananas was recently made from Dutch Guiana to New York (p. 164).

Messrs. Wolstenholme & Holland's latest report speaks of an improved condition of Sea Island cotton market at Liverpool. On page 166 is given the first part of a report of the proceedings at the conference of cotton growers lately held at Barbados.

Under Insect Notes (page 170) a brief article gives remedies for the treatment of the red spider, a pest which sometimes attacks sweet potatos in the West Indies. Other interesting notes on the same page deal with the parasite of the black scale, and a cocoa-nut palm blight reported from Lagos.

A review of the 1906-7 report on the Botanic Station, Experiment Plots, and also on Agricultural Education in Antigua, appears on page 173. On the following page some interesting particulars are given as to the methods adopted in tobacco cultivation in Hawaii.

Protection of Bananas from Insect Pests.

The United States Consul at Brisbane reports that a regulation has been passed by the Queensland Department of Agriculture, providing that all bananas intended for export to Victoria shall be covered with fine cloth netting for three weeks prior to plucking the bunch. This has been found by experiment to be an effective protection against the Queensland fly, which, when introduced, works serious ravages in the orchards. This regulation harmonizes with the Victorian State regulation, which forbids the importation of bananas unless they have been so protected.

Molasses as a Stock Food.

The fattening effects of molasses when used as a stock food are well known, and in Great Britain, there are many proprietary feeding-stuffs on the market of which molasses is the chief constituent. In Louisiana, it is reported, the practice of feeding this material to draught animals, as a regular portion of their daily ration, is growing in favour. From figures collected by an official at the Louisiana Experiment Station, it appears that about 10 lb. of molasses per head is the average quantity fed to the horses and mules. Some green food, such as pea vines or cane tops, are chopped and mixed with the molasses, as well as a few pounds of some concentrated food, such as cake or corn. It is always desirable to begin with small amounts of molasses when this material is first introduced into a ration.

The conclusions drawn from the data collected in Louisiana are certainly in accord with the generally accepted view that molasses, where it is available at resonable prices, constitutes a nutritious and easily digested, as well as economical, constituent of a ration for draught animals.

Sulphate of Ammonia from Peat.

A method for producing sulphate of ammonia from peat, known as the Woltereck process, has lately been patented, and works have been erected in County Antrim, Ireland, in the neighbourhood of which there is an abundant supply of the raw material. The process consists in passing a mixture of air and water vapour over peat kept at a low grade of heat in specially devised furnaces. Ammonia is one of the chief gases given off, and this is led into an acid tower, where it is absorbed by sulphuric acid, forming sulphate of ammonia. Acetic acid is another product of the process. The holders of the patent claim that a yield of sulphate of ammonia equal to 5 per cent. of the dried peat can be relied upon, and estimate the cost of production of the ammonium sulphate at £5 8*s.* 3*d.* per ton. Considering that there is in Europe alone, an area of bog land, useless for agricultural purposes, of 136,137,750 acres, it will be seen that the new process will have ample scope, and any means of adding to present supplies, and reducing the cost of nitrogenous fertilizers will be welcomed by agriculturists all the world over.

Rubber in New Guinea.

From the particulars contained in a note in the *Board of Trade Journal* (No. 589) it would appear that the natural conditions which exist in Papua (New Guinea) are especially suited for the cultivation of rubber trees. The territory possesses a large area of easily accessible virgin forest and other land near the coast, and there are tracts of equally good land in the interior. It is mentioned that in one district there are cultivated Para rubber trees, three and a half years old which are 18 inches in circumference at 3 feet above the ground, and seeding in their fourth year, which gives evidence of early maturity. These trees were raised from seed. Other trees, notably the rubber-producing *Ficus elastica*, it is stated, have also shown remarkable development during four years of growth.

Canadian Cattle and the West Indies.

As a result of the interest that has lately been created on the subject of increased trade between the West Indies and Canada, the Dominion Government recently sent Mr. E. B. Elderkin of the Live Stock branch of the Canadian Department of Agriculture, to the British West Indies, to enquire into and report upon the prospects of extending the trade in live stock between Canada and these colonies. Mr. Elderkin visited Demerara, Trinidad—where he addressed a meeting of the Agricultural Society on the subject of his mission—and Barbados, and also called at some of the Northern Islands.

While the Dominion would naturally reap the chief benefit from increased trade in this direction, yet there is no doubt that West Indian stock owners might with advantage look to the Canadian market for animals for stud purposes, since the Dominion is so famous for the excellent qualities of its breeds of live stock.

Rice Cultivation in Argentina.

An official document giving particulars of the rice-growing industry of Argentina was lately issued by the Agricultural Department of the republic. From this it appears that rice cultivation is on the increase, and the crop is now grown in six or seven provinces, the total area devoted to this cereal being nearly 11,000 acres. It is in the province of Tucuman that rice growing receives most attention, and this province contains more than half the total acreage under the crop. The average production of rice per acre is estimated at about $1\frac{1}{5}$ tons (2,640 lb.). The rice-growing land is comparatively cheap: there is a sufficient rainfall in the provinces mentioned, while the numerous rivers afford facilities for irrigation, and manual labour is not expensive. Last year the total production of rice in Argentina amounted to about 13,000 tons. The quality is somewhat inferior, but it is believed that great improvement would result if more care were shown in the selection of the seed.

Sorghum Poisoning.

The *Journal of Agriculture* of Victoria contains an article, contributed by the chief veterinary officer of the State, on the danger of feeding green sorghum (also known as Guinea corn and millet) to cattle, and from the particulars given it would seem that the risk of poisoning, which is due to prussic acid contained in the plant, is in an inverse ratio to the vigour of the growing crop, since prussic acid is found present in increased quantity in stunted crops and during dry seasons, while it is almost absent in the case of plants that have grown quickly on moist land. Second growths, which are usually inferior in quantity and quality, are also stated to be more dangerous than first crops. The amount of prussic acid present in the plant is also largely increased as the result of heavy dressings of nitrogenous manures.

The prussic acid is present in dangerous amount only in certain stages of growth, from five to seven weeks usually, and gradually disappears shortly after the blossoming stage when the ears begin to form. By the time the seed is ripe the poison has completely disappeared.

Green sorghum should be fed only in small quantity, and never when in an immature state. If the plant is put in the sun to dry after cutting, the danger quickly disappears, since prussic acid is a volatile compound.

An article dealing with the subject of 'Green Sorghum Poisoning' appeared in the *West Indian Bulletin* (Vol. III, p. 326).

Preservation of Pen Manure.

The losses undergone by farmyard manure (which in England corresponds to the pen manure of the West Indies), and various methods of preventing these losses form the subject of an instructive article in the *Journal* of the British Board of Agriculture and Fisheries (April 1908). The loss from the manure is chiefly one of nitrogen, which passes off as ammonia. Several preservative agents have been tried which, when mixed with the fresh manure, either combine with the liberated ammonia, thus preventing its volatilization, or have the effect of reducing the bacterial action which results in the formation of the ammonia. Nearly all these agents, however, are reported as being too costly to be satisfactory. Gypsum (calcium sulphate) is one of the materials that has been longest in use in this way, but the quantity required is too large for the process to be economical. Another drawback to the use of this material is that it is liable to be itself reduced to calcium sulphide by bacterial action, and this latter compound has an injurious effect on plant life. Kainit is somewhat more satisfactory in preventing the volatilization of the ammonia, but it is stated that experiments carried out in Germany have shown that the only practical method of reducing the losses of nitrogen is by placing a layer of old well-rotted farmyard manure as a basis for the new manure heap. This always resulted in smaller losses, a result which is thought to be due to the constant evaporation of carbon dioxide from the layer of old manure, this carbon dioxide combining with the free ammonia to form ammonium carbonate.

INSECT NOTES.

Red Spider on Sweet Potatos.

In a letter to the Imperial Commissioner of Agriculture, Dr. Watts. C.M.G., writes that 8 acres of sweet potatos on an estate in Antigua were seriously attacked by what seemed to be red spider, and specimens of potato leaves with the pest on them were forwarded for examination.

Dr. Watts states that he learns that such an attack is very unusual in Antigua and inquires whether it is known in other places.

On examination of the material received at the Head Office, it has been found that the surmise as to the nature of the pest is a correct one. Red spider is present in large numbers on the leaves and stems.

This is not a rare occurrence in other places, the attacks being always much worse in very dry weather than during the rainy season. The following account of the red spider (*Tetranychus telarius*) of the sweet potato is taken from the pamphlet, published by the Imperial Department of Agriculture in 1906, entitled 'Lectures to Sugar Planters':—

'The red spider is not an insect but a near ally of the true spiders, and its minute size renders it difficult of observation.

'Sweet potatos attacked by this pest are easily recognized. The leaves curl up, turn yellow and drop off. The vines wither and the plants do not form large tubers. The red spider may be found in enormous numbers on the leaves of these plants, and it will spread from one spot, slowly extending over a whole field. There are two simple remedies for this pest—spraying with kerosene emulsion, and dusting with lime and sulphur.'

The spraying could be done with any of the portable sprayers, such as the 'Success' knapsack or the 'Autospray,' and the dusting with lime and sulphur, in equal parts, would be done in the same way as the dusting to control the leaf-blister mite of cotton.

Severe outbreaks of red spider on sweet potatos have occurred in Barbados during the past few years, and the prompt application of sulphur and lime has resulted in marked improvement of the condition of the potato vines.

The Parasite of the Black Scale.

The parasite of the black scale of cotton (*Lecanium nigrum*) which has been mentioned in recent numbers of the *Agricultural News* (see Vol. VI, pp. 154 and 314) is proving to be very useful in checking the attack of the scale insect on cotton in Barbados. During the past year on several estates it has been noticed that the black scale has seemed to affect the cotton less than formerly, although it has been present in large numbers. In such cases it has been found that many of the scales have been parasitized.

The parasite has proved to be a very interesting insect. It has been studied, through the kindness of Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, by Mr. Crawford, one of the assistants at the Bureau of Entomology, who has found that it is of a new genus and new species. He has given it the name *Zalophothrix mirum.* Dr. Howard, writing to the Imperial Commissioner of Agriculture, states that from its structure and relationships, it would be expected to be parasitic on the eggs of other insects, perhaps the eggs of the cockroach, and it is very interesting to find it a parasite of a scale insect.

The relation of insect host and insect parasite is always of interest. It is not possible to tell how far attacks of the scale insect will be controlled by the activities of the parasite, but the more favourable the conditions for the rapid increase of the scale insect or host, the more favourable will they be for the development of the parasite, and the greater will be the proportion of the host destroyed by the parasite.

Another factor comes in, at times, in the form of secondary parasites. These are not to be regarded as beneficial insects, though they are parasitic in their habits. They attack the beneficial parasites and tend to reduce their numbers. It will be seen how complex this subject is, and how these minute insects help to maintain the balance of nature.

Up to the present time no secondary parasites of the black scale have been found, so that it is hoped that the parasite *Zalophothrix mirum* will increase with sufficient rapidity to reduce the black scale to inconsiderable numbers.

A Cocoa-nut Palm Blight at Lagos.

The Imperial Commissioner of Agriculture has recently received from the Under-Secretary of State for the Colonies a report by Mr. H. N. Thompson, Conservator of Forests for Lagos, dealing with the occurrence of a scale insect on cocoa-nut palms in the Badagry district of that colony.

It is reported that the presence of the pest on the trees is indicated by the yellow and brown colours assumed by the leaves as a result of the feeding of enormous numbers of the scale insects, which are to be found on the under surface of the leaf and on the fruit. Badly infected trees lose all their leaves except the apical shoot and one or two of the youngest leaves, the oldest leaves on the tree being the first attacked. The growth of the tree is often seriously checked, and the fruit falls off while small and immature.

The attack is at its worst in the wet season, while the dry days and bright sun of August seem to have an effect in lessening the severity of the attack.

Other trees badly attacked by this scale insect in Lagos are the papaw, banana, sweet sop, cashew nut, and mango. Yams are also badly attacked; roses are affected to a slight extent, and in one instance only the oil palm is recorded as being attacked.

The recommendations for preventing the spread of the disease and for reducing the severity of the attack include the burning of all infected parts of the cocoa-nut palm, and other trees and plants attacked by the same scale insect, and the preventing of the importation of unhusked cocoa-nuts from diseased areas unless they have been sterilized by being thrown into a fire for half a minute or so.

The scale insect of the cocoa-nut in the West Indies is *Aspidiotus destructor*, and though it may not be the same as that in Lagos, yet in its manner of attacking the leaf and fruit it is very similar to it.

RUBBER IN JAMAICA.

The *Journal* of the Jamaica Agricultural Society for April last contains the following note on rubber-planting prospects in the island:—

Rubber planting as an industry on Jamaica estates has only begun of late years, and up till now there has been no systematic tapping of trees and keeping of statistics of yield, on which commercial calculations of the profitableness or otherwise of the business might be based.

From the standpoint of a profitable industry there is a good hope in rubber, especially as, although the trees require good soil, they can be grown to advantage in many places, dry or wet, upland or lowland, or in patches. Rubber planting would not only be of value in creating a new and profitable industry, but would incidentally assist in reafforesting the more select lands.

In regard to suitable varieties, it has been advised that Maniçoba rubber is best fitted for certain dry parts: Virgen rubber (*Sapium* sp.) for certain select parts of the mountains, and Castilloa and Para for moist lowlands, up to 1,800 feet. The last-named may also grow up to 2,000 feet, but this would require test.

PLANTATION RUBBER IN 1907.

The following particulars are taken from a review of the plantation rubber industry during 1907, issued by Messrs. Lewis & Peat, rubber brokers of London:—

During the year the imports of plantation-grown rubbers to London have amounted to about 1,100 tons, against 500 tons during 1906 and 150 tons in 1905, of which about 250 tons came from Ceylon and 750 tons from Malaya. Only comparatively small parcels have so far been sent from Southern India, Burmah, Mergui, and from Java, Sumatra and Borneo. We have good reports of the plantations in the West Indies, Honduras, Nicaragua, and parts of Mexico, but no Para has been tapped in those countries as yet, and only small parcels of Castilloa have come to hand. An interesting parcel, but only of a few hundredweights, of Para from Brazil, prepared on the Ceylon system, was sold recently at a fraction less than Eastern lots. This was from old trees, and was certainly exceptionally strong but very dark in colour. Prices now show a very serious decline from the high rates ruling in 1906. This fall has taken place in sympathy with fine Para from Brazil, and has been caused chiefly by increased supplies and the financial crisis in America and the consequent temporary closing of many of the factories. At the opening sale of the year plantation-grown Para stood at 5*s.* 8*d.*, and after touching 5*s.* 10*d.* in March fell right away to 3*s.* 8*d.* in November, with one rally of 6*d.* per lb. in June. At the closing sale, No. 1 was selling at 3*s.* 10*d.* after having touched, 4*s.* 2*d.* in the previous auction. The exports of rubber from Brazil during 1906 amounted to nearly 42,000 tons, against the previous crop of 38,000 tons.

Very little Castilloa rubber was sold in London during the year, but shipments are increasing from the West Indies, Central and South America. The preparation has improved, and some lots have been very nearly equal to ordinary plantation biscuits. A few lots from Java and Sumatra have arrived in a very low heated condition, making them almost unsaleable. Supplies from Mexico, which promised a few years ago to come in large quantities, have up to now been very small and unimportant, and many large estates that have been planted for from ten to twelve years so far seem failures, and we hear of many estates being abandoned in certain districts.

RULES FOR MILKING.

Some rules worthy of note by milkers appeared in a recent number of *Farm Life*, and are given below, with a few alterations and additions:—

Be careful to draw off all the milk to the last drop, because the last milk extracted is the richest in cream. [It may also be added that unless the animal is milked dry on each occasion, the daily yield tends rapidly to fall off].

Milk at the same time every day.

In milking use all five fingers and not merely the thumb and fore-finger.

To milk successfully young restive cows, keep one of the fore feet raised. Never strike the animals or be rough with them. [The foolishness of being rough will be recognized when it is remembered that the cow herself has control over the milk-yielding system, and regulates at will the ease with which the milk is drawn. When subject to fright or ill-treatment the difficulty of extracting the milk is at once very much increased, and the full quantity is never obtained in such cases].

Always keep the hands clean, and also the cow's udder and the dairy utensils.

NOMENCLATURE OF EDDOS AND SWEET POTATOS.

As a result of the publication in the *Agricultural News* (Vol. VI, p. 405) of a list of the eddos and sweet potatos cultivated at Barbados on land under the care of Mr. J. R. Bovell, Agricultural Superintendent of the island, an application for tubers of several varieties was received by the Imperial Commissioner from Mr. O. W. Barrett, of the Bureau of Plant Industry, U.S. Department of Agriculture.

The following notes on the nomenclature of a few of the eddos mentioned in the list in question, are given as the result of suggestions offered by Mr. Barrett, in reference to varieties with which he had considerable experience while engaged at the Porto Rico Experiment Station:—

Malanga Blanca.—This is a Cuban variety and is probably identical with 'Rolliza,' as also is 'Trinidad Yellow.'

Guayamera.—The name 'Guayamera' is a local one, and the term 'Colorado' (which means *red* throughout Spanish America) is preferable for this variety, which is one that is easily confused with the 'Prieta' eddo.

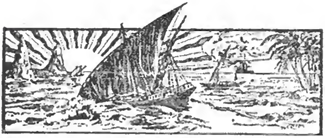
Malanga (Bea Cuba).—This should read 'Malanga (via Cuba).'

Amarilla and *Gris Amarilla.*—For the purpose of avoiding confusion these varieties have been re-named. In the case of the first, the term 'Amarilla' has been dropped in favour of 'Martinica.' The word 'Gris' has also been dropped from the old name of the second, which is now known simply as 'Amarilla.'

Belembe.—This variety does not produce tubers, but the leaves when boiled have a better flavour than those of the common eddo.

Taro Japanese.—This eddo is of the dasheen type, but it appears to be inferior to the West Indian dasheens.

In reference to the list of sweet potatos, Mr. Barrett suggests that the proper name of the variety known locally as 'Van Ness Red' is 'Van Nest Red' and similarly that the name 'Vineless Beech' should read 'Vineless Bunch.'



GLEANINGS.

Mr. H. H. Cousins, M.A., has been appointed Director of Agriculture and Island Chemist of Jamaica, at a salary of £850 per annum with official residence.

The London *Produce Markets Review* estimates a shortage of 530,000 tons of sugar on the cane crop of the world for 1907-8.

The first shipment of bananas, comprising about 2,500 bunches, was recently made from Dutch Guiana to New York by the Royal Dutch West India Mail line.

Dr. R. H. Lock, of the University of Cambridge, has been appointed Assistant Director of the Royal Botanic Gardens, Peradeniya, Ceylon.

Although it is not yet possible to give complete figures showing the cotton exports from St. Vincent for 1907-8, the total crop of the season is estimated at 432,000 lb.

A valuable and well-illustrated series of articles, entitled 'The Manufacture of Sugar from the Sugar-cane,' is now appearing in the *West India Committee Circular*. The first article was published in the *Circular* of March 3 last.

The *Journal* of the Jamaica Agricultural Society (March 1908) recommends a mixture of 2 parts lard, 1 part kerosene, and 1 part flowers of sulphur, as being most useful for the purpose of destroying parasitic insects on sitting hens. The materials should be made into a paste, and rubbed on those parts of the hen's body which are attacked by the insects.

In his address at the opening of the present session of the Combined Court of British Guiana, the Governor of the colony referred to the increased activity shown of late in the collection of balata. While the quantity exported in 1905-6 was 650,000 lb., the shipments for 1907-8 were estimated to reach at least 950,000 lb.

The disposal of the present season's crop of cotton seed at St. Croix formed the subject of a note in the *Agricultural News* of May 2 (Vol. VII, p. 140). In this connexion we are authorized by Messrs. H. E. Thorne & Son, Ltd., of Barbados, to state that they will be pleased to purchase cotton seed from St. Croix growers who have supplies for disposal.

The prospects of coffee planting have of late years rapidly improved in Mexico. Modern methods of curing the beans have been adopted on all the larger plantations, and it is estimated that the coffee exports for 1907-8 will reach 50,000,000 lb. Reports from the coffee districts, received some months ago, state that there was every prospect of an excellent crop. (*U. S. Consular Reports.*)

A contagious disease affecting mules and horses, and known as epizootic lymphangitis, is officially reported as having been just discovered among a batch of mules recently imported into British Guiana from the United States. The affected animals have been isolated, and it is stated that every precaution is being taken to prevent the spread of the disease.

Mr. Jones reports that a plant of *Baikea insignis*, received in 1903 from the Royal Gardens, Kew, has recently flowered at the Botanic Station, Dominica. This is a striking species of the Leguminosae, a native of tropical Africa, and its flowering at Dominica is an event of some interest. The petals are long, strap-shaped, and beautifully white, unlike any other member of the pea family.

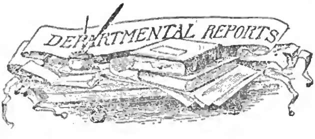
The spread of the prickly pear (*Opuntia* spp.) is a source of anxiety in South Africa and Australia, but from particulars given in a recent bulletin of the Bureau of Plant Industry (U.S. Department of Agriculture) it appears that the plant is largely grown in Mexico for the sake of its edible fruits. Different plants vary somewhat in characteristics, and it is thought that by selection, a good deal might be done to render the plant more useful for food purposes.

The United States Consul at Valencia, Spain, reports great depression in the Spanish orange-growing industry. Growers have been forced to sell their fruit at prices which, after deducting packing expenses, freight, etc., leave practically no profit whatever. It is stated that Jamaica and Jaffa oranges are more popular than Valencias on the British market, and Spanish oranges are unable to compete with the more favoured varieties.

A bulletin giving particulars of work with sugar-cane seedlings at the Harvard Botanical Gardens, Cuba, was lately issued, and it is stated that the Barbados seedling B. 109 has given good results when crossed with Cuban canes. The Demerara seedling D. 95 is also reported to have given excellent results in this way. D. 95, it may be mentioned too, gained a very high position in trials with sugar-cane seedlings carried out at the Hawaiian Sugar Planters' Experiment Station.

Many varieties of chillies (*Capsicum annuum*) are grown in Roumania. The young plants (raised in seed-beds) are set out on light soil, in warm positions, at distances of from 10 to 18 inches apart. With the exception of abundant applications of water (which have a great influence on the yield of fruit) and occasional hoeings, the crop receives little attention. The chillies are very popular with the Roumanians, being eaten in the green state and as salads, as well as cooked, and as condiments with meat.

In connexion with the various articles on the cultivation of ground nuts that have lately appeared in the *Agricultural News*, it may be mentioned that these nuts and their products have many uses. In the United States enormous quantities of ground nuts are used for confectionary purposes. Ground nut oil is a valuable product and the chief substitute for olive-oil. The best grade is used for culinary purposes, while lower grades are used in soap manufacture, for lubricating and illuminant purposes. The cake left after the expression of the oil is a valuable stock food.



ANTIGUA: REPORTS ON BOTANIC STATION, EXPERIMENT PLOTS, AND AGRICULTURAL EDUCATION, 1906-7.

Rather more than half this report is of a general nature, being comprised of a historical account of the Botanic Station, of the experimental work carried out at Antigua, the development of the various agricultural industries, and the progress made with agricultural education in the island, during the years 1898-1907, with the assistance of the Imperial Department of Agriculture. The report is well illustrated with photographic reproductions.

The first Botanic Station at Antigua was established at Clare Hall in 1889. In 1894, however, the Station was transferred to Victoria Park, St. John's, and when the Imperial Department of Agriculture was organized in 1898, the Antigua Botanic Station in common with others in the West Indies came under its control. At the same time, Dr. Francis Watts, C.M.G., (till now Government Analytical Chemist at Antigua) was appointed Agricultural Chemist for the Leeward Islands colony. In 1902, Dr. Watts became Superintendent of Agriculture for the Leeward Islands. The present Curator of the Antigua Botanic Station, Mr. J. Jackson, was appointed in 1905.

The most important and successful efforts of the Imperial Department of Agriculture in Antigua have been those connected with the sugar-cane experiments, and the introduction of the Sea Island cotton industry. A series of sugar-cane experiments was started in Antigua in 1889, by the local Government. Nine years later, on the establishment of the Imperial Department, experiments on a much more extensive scale were instituted, and have since been carried on under practical estate conditions, in several parts of the island. The value of these varietal tests and manurial trials is fully appreciated by the planting community of the island, and great interest is shown in the annually published reports on the work done.

The Sea Island cotton industry of Antigua dates from 1903-4, when an area of about 500 acres was planted, and the exports of lint amounted to nearly 28,000 ℔.

The increasing interest taken in the cultivation is indicated by the fact that the shipments of lint were practically doubled each succeeding year from 1903-4 to 1906-7. In the last named year between 1,800 and 1,900 acres were planted with cotton. The season was unpropitious, but over 180,000 ℔. of lint were exported. Conditions are not so encouraging at the present for increase in the cotton area, but it is hoped that the depression is only temporary.

At the two Experiment Stations at Scott's Hill and Skerrett's, experimental work in connexion with the cultivation of such crops as sweet potatos, yams, cassava, maize, broom corn, and lemon grass, has been in progress for some years, with the result that considerable information of local value has been obtained. The experiments dealing with various points in relation to cotton cultivation are especially worthy of mention.

Other means by which the Imperial Department has endeavoured to assist the various agricultural interests of Antigua have been the provision of stud animals for the purpose of improving the local breeds of stock, the arrangement of periodical visits to different districts by the Curator of the Botanic Station for the purpose of giving advice and demonstrations to planters and small cultivators, the provision of facilities for agricultural education, and the regular holding of Agricultural Shows. Under the encouragement it has received, agricultural teaching and school garden work in connexion with elementary schools have reached a high stage of development in Antigua. Practically all the schools of the island possess garden plots, and all elementary school teachers are now required to be proficient in the elements of scientific agriculture, and to teach the subject in their schools. In order to give the same facilities for instruction to the children of the middle and upper classes of the island, an Agricultural and Science Master (Mr. A. H. Kirby, B. A.) was appointed by the Imperial Department of Agriculture and primarily attached to the Antigua Grammar School in 1903.

Coming to the work of the year under review, it is seen that the sum expended in connexion with the Botanic Station and Experiment plots amounted to £527 2*s.* 6*d.*: the total receipts for the year were £232 10*s.* 8*d.*, the receipts for the sale of plants, etc., being £18 11*s.*

During the year 2,880 plants were distributed from the Botanic Station, in addition to a large number of cuttings and seeds of economic plants.

The rainfall in 1906-7 was 58·92 inches. This was 23·82 inches in excess of the previous year, and 7·39 inches more than the average for the five years preceding.

The usual experiments with various food crops, cotton, green dressings, citrus fruits, etc., were continued at Scott's Hill and Skerrett's. The work done in this way is of a very practical nature.

The work of the Agricultural and Science Master also followed in general the lines adopted in the previous years, at the Antigua Grammar School and at the Girls' High School. A series of lectures was given to the students at the Female Training College, and a further course of lectures to teachers in elementary schools.

DEPARTMENT NEWS.

With the approval of the Right Honourable the Secretary of State for the Colonies, the Imperial Commissioner of Agriculture will proceed to the United Kingdom on duty leave on June 2 next. It is proposed that Sir Daniel Morris will attend the Sea Island Cotton Conference to be held under the auspices of the British Cotton-growing Association at Manchester from August 5 to August 11, and devote attention to other matters in which the West Indies may be interested.

Mr. W. N. Sands, Agricultural Superintendent of St. Vincent, left for England by the R.M.S. 'Atrato' on May 19 last, on vacation leave of absence.

Mr. Geo. F. Branch, Agricultural Instructor at Grenada, returned from England by the R.M.S. 'Tagus' on May 13 last, after six months leave of absence.

TOBACCO CULTIVATION IN HAWAII.

During the past three or four years extensive experimental work in connexion with the cultivation and preparation of tobacco has been carried on in Hawaii, and judging from the results of this work as embodied in *Bulletin 15* of the Hawaiian Agricultural Experiment Station, tobacco cultivation promises to become one of the staple industries of the territory.

For the cultivation of tobacco a light, porous, well-drained soil containing a large percentage of humus is necessary. The great proportion of the soils of Hawaii meet these requirements. As regards climatic requirements, it is stated that ideal conditions, from the tobacco grower's point of view, exist on the slopes of the higher mountains, where cloud belts gather daily. The natural shade thus provided would do away with the necessity for supplying artificial shade. Under these conditions it would be possible to produce tobacco yielding a good proportion of leaves suitable for wrapper purposes. The burn of the Hawaiian tobacco was reported upon as exceptionally good. Burning qualities of the tobacco leaf appear to depend upon the texture of the soil, its percentage of clay, and its water-holding capacity.

In preparing seed-beds for tobacco plants, the workers at the Experiment Station recommend that the soil should be sterilized previous to use. In cases where live steam is not available, a simple device, which may be made use of by any grower, is described in the pamphlet. It is important that the soil of the seed-bed should be exceptionally rich, more particularly in organic matter. It is necessary that the soil should also be thoroughly cultivated to a fine tilth. The best results are only obtained when the growth of the plant is forced throughout the entire period.

By the erection of a suitable framework over the seed-beds provision was made by means of which a covering of muslin may, when necessary, be utilized to shade the young tobacco plants. The seed is thinly scattered over the surface of the seed beds, and lightly raked in. The necessity for keeping the soil suitably moist is emphasized.

It is recommended that plants in the seed-bed should be fully exposed to the air for a week before transplanting so as to harden them off. They are best transplanted when from seven to ten weeks old. The soil of the field should have undergone good preliminary tilling before the plants are set out, and the crop is one which needs plenty of manure.

It is pointed out that soil on which tobacco is to be cultivated should contain abundance of lime, and the most suitable manures are probably about 2 cwt. of basic slag together with the same quantity of sulphate of potash, per acre, sown broadcast and harrowed in, some months before the plants are set out. Potash should not be applied to tobacco in the form of potassium chloride, since the chlorine is detrimental to the burning qualities of the leaf. An application of nitrogenous fertilizer, one-half of which should be at once available, e.g., as nitrate of soda, and one-half in organic form, as dried blood or cotton seed meal, should be given at the time of transplanting.

Tobacco plants should preferably be transplanted on cloudy days. In the case of Cuban and Sumatra varieties they should be set out 25 inches apart in the row. Other varieties, 24 inches apart in the row. The rows should be from 42 to 48 inches apart. After-cultivation consists in weeding and loosening the soil. After the plant is well established, however, only light hand-hoeing can be carried on owing to the danger of damaging the roots of the plant.

The pamphlet contains description and plans of barns suitable for curing operations. It is estimated that for over 100 acres of tobacco, 10,000 cubic yards of barn space will be necessary for curing operations, assuming that the structures are provided with artificial heat, which, it is recommended, should be the case. If no artificial heat is provided, it is estimated that from 18,000 to 20,000 cubic yards of barn space will be required for every 100 acres of crop. The fermenting room should be well constructed with air-proof and moisture-proof floor and walls absolutely under control as to heat, moisture, and ventilation. It should also contain a suitable press for baling the leaves

The plans further provide for a sorting room close to the fermenting room. The above buildings are mentioned as being absolutely necessary for planters who propose to take up tobacco cultivation on a commercial scale.

The pamphlet also contains directions as to curing, sorting, bundling, and fermenting the different kinds of wrapper, binder, and filler tobaccos, and gives instructions for baling, grading, and marketing.

WATER SUPPLY FOR BEES.

The necessity of providing a supply of clean water for bees is commented upon by a writer in *Gleanings in Bee Culture*, and it is pointed out that much valuable time is frequently lost by the bees in having to fly long distances in search of water, of which they require a considerable quantity. Under these conditions it is obvious that the best returns cannot be obtained from bee-keeping. Bees, too, are drowned in large numbers in drinking from pools, or from water contained in ordinary vessels, but this continuous loss may be obviated by placing chips of wood in the water, on which the bees can alight. The following paragraphs are taken from the article in question :—

In many places bees can obtain water for themselves without making any long journey, by visiting drinking places of horses and cattle and also pumps, etc. But in such places the insects are frequently a great annoyance. Generally, too, many bees are drowned under such conditions. To avoid this annoyance and loss, it is well worth while to have a place where the bees may find water at all times.

Such a place should be provided before the bees have formed the habit of visiting a pump or horse-trough, for that habit having been once formed, the bees will not, under ordinary circumstances, pay the slightest attention to any other drinking place. They may, however, by suitable means, be enticed away to a new place, if it be only a few feet, or even a few yards distant. For this purpose, the pump or horse-trough should be covered up so that the bees cannot drink from it, and a vessel of water set near by. Next day, and each day thereafter, the vessel should be moved a little nearer the hive. After getting a short distance away, it can be moved 5 or 10 feet each day. Keep the old drinking place covered up for a few days, and afterward keep water constantly at the new place, and there should be no more trouble.

Whatever vessel is used should hold a good supply of water ; and then if care is taken to refill it before it has been completely emptied, there is not much danger that it will often be entirely dry.

The best thing I have ever tried is a tub, or half-barrel, with cork chips or cork dust thrown on the water. Put in all the chips possible, provided that the bees will have no difficulty in reaching the water. The bees are just as safe walking over them as on the ground.

THE JAMAICA EARTHQUAKE.

A further extract (see *Agricultural News*, Vol. VII, pp. 123, 139) from Dr. Vaughan Cornish's article 'The Jamaica Earthquake, 1907,' which appeared in the *Geographical Journal* for March last, is given below. In these paragraphs Dr. Cornish deals with the observed effects of the earthquake in parts of the island outside Kingston:—

I pass on now to describe the distribution of earthquake damage over the island. I myself closely inspected Kingston, Lower St. Andrew, and Buff Bay Town. I also examined the damage to the town of Port Royal, and visited Gordon Town and Port Antonio, besides paying cursory visits to some other places. For the estimate of damage to other places embodied on the map I have relied upon the evidence of others, most of which I obtained direct from eye-witnesses. I have taken great pains to sift the evidence, and to compare where possible the narratives of different persons. The result is far less satisfactory than a complete survey of the island would have been, but it is, at any rate, a much more extensive collection of such data than has hitherto been published.

I received several narratives from persons who, at the time of the earthquake, were in the mountains between New-Castle and Gordon Town, and between Silver Hill and Buff Bay; also from persons at Gordon Town and near Castleton. Their narratives indicate that the shock in these situations was quite comparable in intensity to that in Kingston. Particularly striking was the experience of a party of tourists, who were blocked by a fall of rock on the road leading down to Buff Bay, and had to spend the night in the mountains. The after-shocks were numerous, and each was preceded and accompanied by an appalling noise. The severe landslips about Newcastle and on the north of Silver Hill are evidence of as much force as that required to wreck a house, and the complete wreck of the Gardens House at Gordon Town, of which I took a photograph, indicates, I think, an intensity greater than that at Constant Spring or near Papine corner.

The damage at Buff Bay, of which I also show a photograph, was severe, but the stone buildings do not show evidence of having resisted the shock to the same extent as the brick buildings of Kingston. They collapsed instead of being flung to one side, therefore they probably fell at once: for if they had resisted during an appreciable time, the walls would have got up a swing, and then must have been flung either one way or the other. I estimate the force at Buff Bay as about equal to that at Constant Spring, somewhat less than that at Gordon Town, and considerably less than that in the eastern half of Kingston. The damage to the town of Port Royal was about the same as that in the less damaged parts of Kingston.

If we consider the points where buildings fell and where new landslips were formed on hillsides, we see that they may almost be included between two straight lines joining Harbour Head with Buff Bay Town on the eastern side, and Port Royal with Enfield on the western side. The general impression received at the time was that the earthquake at Kingston came from the sea, and the fact recorded by the Port Royal pilot, Mr. Hunt, that his boat lying by Lime Cay was struck before Port Royal, and that the shock was followed (in about one and a half minutes) by a surface sea-wave from the south-west, strengthens this idea. Looking at the band of fallen buildings across the island, the idea suggests itself of a seismic wave coming from beneath the sea rather west of south from Kingston, and rushing with scarcely diminished force right across the island, the centre of the wave-front passing close to the Penitentiary, the full force of the wave being felt in the eastern half of Kingston and in the eastern suburbs.

On the north side of the island a 'tidal wave' of considerable magnitude was observed at Hope Bay, Orange Bay, Buff Bay, Annotto Bay, Sheerness Bay, Ocho Rios, and St. Anne's Bay (that at Port Antonio was quite small), this phenomenon commencing near Buff Bay on the east, but extending far to the westward. It may have been produced by sand-slides from the edge of the submarine land shelf shown on the map, which is close inshore all along the coast, and outside of which lies water of great depth. The 'tidal wave' consisted of a recession of water from the shore, followed by its return in waves. At Port Maria this is reported to have occurred a few minutes before the earthquake.

Off the south coast the breaking, 'bird-caging,' twisting and burying of the 'Direct' submarine cable all along the line from Bull Bay to Yallah's point, indicate great sand-slides along that steep submarine slope, where, moreover, large quantities of detritus are continually brought down by the rivers which rise in the Blue Mountains. There is no cable under the Healthshire hills, and away along the coast to the west, but the fact of breakage as far east as Yallah's point shows the great effect of the earthquake beneath the sea far to the east of Kingston on the south coast. The eastern boundaries of considerable disturbance at sea are joined by a line running from Hope Bay on the north coast to Yallah's point on the south, and the western boundaries from St. Anne's Bay on the north to Fort Clarence, where a 'tidal wave' was observed, on the south.

CACAO INDUSTRY IN JAVA.

La Chronique Coloniale of March 8 last discusses in a lengthy article the condition and progress during recent years of the cacao industry in Java.

From 1900 to 1905 average crops were obtained, except in 1902, which was a very bad year, yielding only a quarter of an ordinary crop. Good returns were obtained in 1904 and 1905, while 1906 was also a satisfactory year.

It is stated that the cacao trees have many active enemies in Java, in the shape of insect pests and fungus diseases, and the plantations need constant attention. Many planters, it is reported, have given up cacao growing on this account. On the other hand, many new men are entering the industry, and the number of plantations on which cacao is grown is annually increasing. In 1904 there were 158 plantations; the number had increased to 162 in 1905, to 168 in 1906, and to 188 in 1907. It would appear, however, that in the great majority of cases, cacao is a cultivation subordinate to sugar and not the only, or even the chief, crop grown.

In 1904 Java exported 977,417 kilograms of cacao [1 kilogram = 2·2 lb.]. In 1905 the shipments increased to 1,030,094 kilos., and to 1,815,912 kilos. in 1906. The output has therefore increased almost at the rate of 100 per cent. during the three years in question. The exports for the first six months of 1907, 857,306 kilos., were nearly equal to the total output of 1904.

Holland naturally furnishes the chief market for cacao from Java. In 1906, that country imported 1,138,161 kilos. from the island. The United States in the same year took 375,187 kilos., 211,437 kilos. were shipped to Singapore, while Great Britain imported 69,983 kilograms.

MARKET REPORTS.

London,—May 12, 1908, 'The West India Committee Circular; Messrs. E. A. de Pass & Co., May 1, 1908.

Arrowroot—1⅝d. to 2⅜d.
Balata—Sheet, 2/1 to 2/4 ; block, 1/7½ to 1/8 per lb.
Bees'-wax—Good quality, £7 15s. to £7 17s. 6d. per cwt.
Cacao—Trinidad, 75/- to 84/- per cwt.; Grenada, 69/- to 72/- per cwt.
Coffee—Santos, 29s. 9d.; Jamaica, 37/- to 57/- per cwt.
Copra—West Indian, £16 per ton.
Cotton—St. Vincent, 15d. to 17d.; Barbados, 15d. to 17½d.; St. Kitt's, 15d. to 17½d.; Montserrat, 15d. to 16½d. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—4/6 to 5/- per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—14/- to 16/- per box.
  Oranges—Jamaica, 6/- to 7/- per box.
Fustic—£3 10s. to £4 10s. per ton.
Honey—19s. to 34s. per cwt.
Isinglass—West India lump, 1/9 to 1/11 per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £12 per cask of 108 gallons; Distilled oil, 1/9 to 1s. 10d. per lb. ; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10s. to £4 5s. per ton; roots, £2 10s. to £3 10s. per ton.
Mace—1/2 to 1/5 per lb.
Nutmegs—66's to 68's, 8d. to 8½d.; 76's, 6d.; 91's, 5d.; 105's to 118's, 4¼d.; 121's, 3½d.; 149's, 3¾d.
Pimento—Quiet ; 2⅛d. to 2¼d.
Rum—Jamaica, 3/3 to 8/- ; Demerara, 1/3 to 1/4½ per gallon ; Trinidad, no quotations.
Sugar—Crystals, 18/6 to 19/6 per cwt. ; Muscovado, 17s.; Molasses, no quotations.

New York,—May 1, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 16c. to 20c. ; Grenada, 16⅜c. to 17c. ; Trinidad, 16c. to 16½c.; Jamaica, 13¼c. to 13½c. per lb.
Cocoa-nuts—Jamaica, select, $22·00 to $23·00; culls, no quotations; Trinidad, $20·00 to $21·00; culls, no quotations.
Coffee—Jamaica, good washed, 7c. to 11½c.; good ordinary, no quotations.
Ginger— 12½c. to 14c. per lb.
Goat Skins—Jamaica, 53c. ; St. Thomas, St. Croix, St. Kitt's, 48c. to 49c., dry flint per lb.
Grape Fruit—Jamaicas, $1·75 to $2·50 per box and $3·75 to $4·50 per barrel.
Limes—Dominica, $7·50 per barrel.
Mace—29c. to 33c. per lb.
Nutmegs—110's, 10¼c. to 10½c. per lb.
Oranges—Jamaica, $2·75 to $3·50 per barrel.
Pimento— 4c. to 4½c. per lb.
Sugar—Centrifugals, 96°, 4·42c. ; Muscovados, 89°, 3·92c. ; Molasses, 89°, 3·67c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., May 19, 1908; Messrs. T. S. Garraway & Co., May 26, 1908

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $14·00 to $15·00 per 100 lb.
Cocoa-nuts—$14·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·50 per 100 lb.
Manures—Nitrate of soda, $65·00 ; Ohlendorff's dissolved guano, $55·00 ; Cotton manure, $42·00 ; Cacao manure, $40·00 to $42·00 ; Sulphate of ammonia, $72·00 to $75·00 ; Sulphate of potash, $67·00 per ton.
Molasses—Choice, 15c. ; Fancy, 17c. per gallon.
Onions—Bermuda loose, $1·21 to $1·69 per 100 lb.
Potatos, English—$2·30 to $3·00 per 160 lb.
Peas—Split, $6·50 ; Canada, $3·26 per bag.
Rice—Demerara, $5·25 to $6·10 (180 lb.) ; Patna, $3·50 to $4·00; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—Muscovado, 89°, $1·90 to $2·00 per 100 lb., package included ; Dark crystals, $2·50 ; Centrifugals, $2·25 to $2·60 per 100 lb.

British Guiana,—May 16, 1908, Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $9·50 to $10·00 per barrel.
Balata—Venezuela block, 32c. ; Demerara sheet, 48c. per lb.
Cacao—Native, 16c. to 18c. per lb.
Cassava—$1·00.
Cassava Starch—$9·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 12c. to 13c. ; Jamaica, 12c. per lb.
Dhal—$5·50 to $5·60 per bag of 168 lb.
Eddos—$1·20 per barrel.
Molasses—Yellow, 19c. ; Dark, no quotations.
Onions—Madeira, 3c. to 3½c. ; Lisbon, 3c. to 3½c. per lb.; Dutch, no quotations.
Plantains—36c. to 60c. per bunch.
Potatos,—English, $2·40 to $2·50 per barrel.
Potatos, Sweet—Barbados, $1·12 to $1·20 per bag.
Rice—Ballam, $6·25 to $6·40 ; Creole, $5·50 for good ; Secta, $6·00 per bag.
Split Peas—$6·00 to $6·10 per bag (210 lb.); Lisbon, $4·59.
Tannias—$2·28 per bag.
Yams—White, $2·64 ; Buck, $2·16 per bag.
Sugar—Dark crystals, $2·70 to $3·10 ; Yellow, $3·10 to $3·20 ; White, $3·70 to $3·80 ; Molasses, $1·80 to $2·00 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
——— **Cordwood**—$2·40 to $2·64 per ton.

Trinidad,—May 16, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$14·25 to $15·25 per fanega.
Cocoa-nuts—$24·00 per M., f.o.b.
Cocoa-nut Oil—60c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·25 to $2·40 per 100 lb.
Dhal—$5·00 to $5·10 per 2-bushel bag.
Onions—$3·00 to $3·50 per 100 lb. (retail).
Potatos, English—$1·90 to $2·00 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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Rice Industry of British Guiana.

FREQUENT notes and articles in relation to the rapid extension of rice cultivation in British Guiana have appeared in past numbers of the *Agricultural News* (Vol. V, p. 193, and VI, p. 210).

In the year 1900 less than 6,000 acres were under rice in the colony. In the following year, however, the area devoted to the crop had increased to 13,688 acres. This expansion has been continuous since then. In 1905-6 the rice area was 23,853 acres and in 1906-7 it reached 26,567 acres. Owing to the prevailing good prices, still further attention was given to the crop in 1907-8. New lands were taken up, and numerous rice mills are being erected in those parts of the colony where the crop is grown. For the present season it is estimated that very nearly 30,000 acres of rice were planted in British Guiana. The cultivation of the crop is to a large extent carried on by the coolie labourers, great numbers of whom, at the expiration of their term of indentured labour, obtain small plots of land, and take up rice growing. The negroes of the colony have slowly followed the example of the East Indians.

While the yields ordinarily obtained from the crop in British Guiana vary considerably in different districts, the average return of paddy, on lands properly irrigated and drained, works out at about 28 bags (each of 120 lb.), or 30 cwt., per acre. In a paper on the subject read at the West Indian Agricultural Conference of 1906, the Hon. B. Howell Jones mentioned that in certain places, on comparatively new land, he had seen as many as 38 bags produced on a single acre. From the area planted in 1905-6, 23,728 tons of paddy were produced, while 40,472 tons were yielded by the increased acreage planted in 1906-7.

The effect of the local production of rice on the quantities of this cereal imported into the colony during recent years has been very marked. In 1899-1900, the quantity of rice imported into British Guiana was 25,341,210 lb. By 1905-6 the imports had decreased to 13,289,573 lb., and in 1906-7 had fallen to 6,162 476 lb. The official returns giving the rice imports for the six months from April 1 to September 30, 1907, indicate a still greater rate of decline on comparison with the corresponding period for the previous year. From April to September 1906, the quantity of rice brought into the colony from foreign sources aggregated 3,609,854 lb., while for the corresponding period of 1907, the imports reached only 1,455,865 lb.

In view of the fact that there is a Customs duty of 35c. per 100 lb. of rice brought into British Guiana, it is evident that the decline in the imports necessarily causes a corresponding decrease in the revenue receipts. It is understood, however, that the intention of the Government of the colony is to give the rice industry a fair chance of development, before attempting to impose any tax with the object of compensating the Public Treasury for the loss sustained on the import duties. It may be mentioned, too, that this loss is probably not so great as it may seem, since the rice industry is of immense value to the colony, and its flourishing condition is the source of a large measure of public prosperity.

The decline in the imports indicates that the local demand is being increasingly met by the home-grown product, but during the past few years British Guiana has also developed an extensive export trade in rice. The chief shipments are made to the British West Indies, and to the French and Dutch Guianas. Rice was first exported from the colony in 1902-3, when shipments were made, amounting to 10,506 lb., of the value of $290·04. In 1904-5, the exports were 61,225, of the value of $1,709·44, while in 1906-7 they reached 3,474,512 lb., of the value of $89,078. From January to December 1907, the total exports of rice from British Guiana reached 4,180,000 lb.

The chief kind of rice grown in British Guiana is a native variety known as 'creole' rice. Trials are being carried on in the colony, under the direction of Professor Harrison, C.M.G., with several imported varieties of rice, chiefly from Ceylon. Seventy-nine varieties were tried in 1906-7. The native rice came out well in comparison, but was exceeded, in point of yield, by six of the imported varieties.

The Ceylon Upland rice, variety No. 6, gave the highest yield of all the kinds tested (39 bags of paddy per acre, as against 36 bags yielded by the creole rice). No. 6. and the variety No. 4, also a Ceylon Upland rice, are mentioned as being suitable for the local trade. Reports have been published on the results of these experiments, showing the periods of growth of the different kinds, yields in bags of paddy per acre, and their milling qualities where possible. Seed paddy of the best varieties, too, is distributed to bona fide rice plant-planters on application. The planters pay only the cost of packing and carriage.

The development of a proper system of irrigation is necessary in many districts, in order to obtain the best results with the rice crop. But, as was pointed out by the Hon. B. Howell Jones (*West Indian Bulletin*, Vol. VIII, p. 188), difficulties in this direction can be largely overcome by care in regard to the season of planting and the variety chosen. If early ripening varieties, such as the Carolina Golden Grain, Honduras, and Dwarf Japan, are planted, the crops will be reaped one or two months earlier.

Extensive experiments carried out in different parts of India and Ceylon indicate that the best returns from the rice crop are always obtained when the seed is sown in nursery beds, and seedlings transplanted to the field when about five or six weeks old. This is the method generally followed in British Guiana, and trials have also proved that planting carefully selected single plants at one hole gives better results than are obtained when two or three seedlings are planted at a hole.

The natural conditions of many parts of British Guiana are so suitable for rice growing, and the early stages of the industry have been attended with such satisfactory results, that, provided a sufficiency of labour is assured, there is every reason to anticipate that the cultivation will develop into one of the most stable and remunerative industries of the colony. It is unlikely that its progress will be hampered by want of labour, since the cultivation is so largely carried on by East Indians, who have a good knowledge of rice growing, and readily take it up on every available spot of land. At present, the industry is more handicapped by the want of capital and suitable organization. Until these requisities are supplied, the methods of planting, reaping, and handling the crop must necessarily remain more or less primitive and wasteful for want of suitable appliances, and the full measure of success cannot be attained.

In connexion with the extension of the industry, it is worthy of note that an export trade in rice meal, a by-product in rice production and a valuable feeding-stuff for cattle, is being developed in British Guiana. From January to May 1908, 1,050 tons of rice meal were exported, as compared with 111 tons shipped during the corresponding period of 1907.

SUGAR INDUSTRY.

Sugar-cane Experiments in Porto Rico.

Sugar production forms the chief industry of Porto Rico, the value of the sugar exports during 1907 reaching $14,738,572. It is confidently anticipated that the output will continue to increase for several years yet, and that with superior canes and improved methods of cultivation, a larger return will be obtained per acre. The *Annual Report* (1907) on the Agricultural Experiment Station of the island mentions that work in the production and trial of seedling canes is in progress, and that many of these seedlings show a much higher percentage of juice than the ordinary varieties cultivated. The following is taken from the section of the report dealing with sugar-cane work :—

Owing to the profitable nature of sugar-cane cultivation, Porto Rican planters employ every means to grow a cane crop year after year on the same land. As nitrogen is by far the most expensive element of the fertilizer, and apparently the one most needed, experiments are being carried out with a view of demonstrating the feasibility of supplying this element in the cane fields by the growing of leguminous crops between the rows. Of the legumes being tested, the cowpea (*Vigna Catjang*) and the horse bean (*Canavalia ensiformis*) are the most promising, but several years' experimental work will be necessary to determine the value of the system of growing these crops on the same ground with cane. The cowpea will mature in seventy days, so that a crop can be readily grown between the rows after planting the canes and again after the last flowering.

Experiments with distances of planting in cane production are being carried on for the purpose of determining the method that will give the most cane per acre at the least cost of production. The usual practice in the island is to plant very close, 5 by 6 feet. The station's experiments have been carried on with hill planting at distances of from 5 by 5 feet up to 10 by 10 feet, and also in continuous rows. For the first crop the narrow planting has given the heaviest yield. As only one crop has been harvested from these plots, figures on the ratoon crops cannot be given, but the indications are that the differences in yield as between the wide and narrow plantings on the second crop will be less than in the case of the plant canes. As the cane is an intensive crop, it seems advisable to grow as much as possible each year on the same area, supplying the drafts on the soil by the application of suitable fertilizers, and avoid thereby the necessity of leaving the lands idle for a series of years, for the purpose of recuperation. In proportion to the development above ground the root system of the cane plant is not extensive, therefore a very heavy tonnage can be taken from a small area.

Some of the large sugar companies in Porto Rico have put in steam ploughs which are going to a depth of 8 inches or more. This is found a very profitable practice, giving large profits for the cost of the work. After the canes are planted, more thorough cultivation of the surface should be given than is usually practised. A great deal of hand labour should be supplanted by the cultivator for reasons of economy.

In planting cane it is a better practice to open furrows with the plough, it being less expensive than cutting holes with spades, as is usually done. Moreover, by this method the ground is stirred to a greater depth and a larger surface is pulverized. From preliminary experiments at the station, continuous rows have given larger yields than the same number of canes planted in squares. In planting in rows, canes were stuck in the ground on end, as is the usual custom. The Hawaiian system of planting the canes in lines covered entirely with earth has also been followed. This is a better practice where the mole cricket (*Scapteriscus didactylus*) does not give too much trouble. Where this insect is prevalent, however, the young seedlings are liable to be cut off when they break through the ground. If the canes are planted entirely below the surface, the young seedlings will doubtless get more nourishment than when planted on end. Again, when planted on end, the ants carry off a considerable amount of the juice of the cutting, and some of it is lost by drying out and rotting above the ground. From the one crop of plant canes, the Hawaiian system gave more tonnage than the similar plots planted in the native fashion, although by the former method a small portion had to be replanted because of the ravages of the mole cricket.

Deterioration of Sugars on Storage.

Under ordinary trade conditions sugar is frequently kept in storage for more or less lengthy periods, and in these circumstances it is liable to undergo fermentive changes whereby the amount of sucrose present is decreased. This question, in regard to muscovado sugar, was dealt with by Dr. Francis Watts, C.M.G., and Mr. H. A. Tempany, B. Sc., in a paper contributed to the *West Indian Bulletin*, Vol. VII, p. 226. The work of these two investigators indicated that the fermentation changes were induced by a micro-organism, which might be destroyed on sterilization by heating.

Further investigations on this subject have been lately carried out at the Hawaiian Experiment Station, and the results of the work are embodied in *Bulletin 24*, issued by the Station. The following is a summary of the chief conclusions arrived at :—

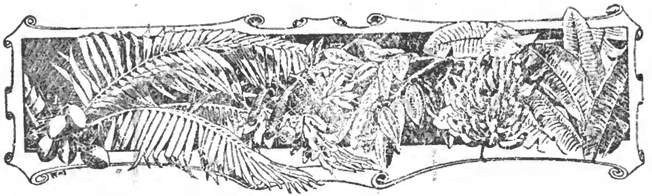
In the great majority of cases deterioration in stored sugar is the result of bacterial activity, but a fall in polarization sometimes occurs without any evidence of this being due to bacteria.

The presence of moisture is necessary for the bacterial action to take place, but so long as the sugars do not contain more than 1 per cent. of moisture, the danger of bacterial action is small.

Four distinct organisms are often present in Hawaiian sugars, and one of these was of very frequent occurrence in sugars which deteriorated.

The capacity of sugars for absorbing moisture varies largely, and this is an important factor in determining the keeping qualities of the sugars. Some evidence exists that the quantity of moisture absorbed is connected with the amount of chloride present in the sugar.

In factories where trouble is experienced on account of the deterioration of sugars, the provision of an interior paper lining to vessels containing the sugar might be of service in protecting the contents from the influence of atmospheric changes.



WEST INDIAN FRUIT.

MANGOS AND BANANAS IN PORTO RICO.

The *Annual Report* (1907) of the Agricultural Experiment Station of Porto Rico is just to hand, and contains an account of the investigations in progress at the Station, and the routine work of the past year. The reports of the various scientific officers, as the Physiologist, Horticulturist, Entomologist and Plant Pathologist, and Coffee Expert are appended. The following notes on the progress made during the year in the production, for export, of mangos and bananas are taken from the report of the Horticulturist:—

> The interest in mango growing is increasing. The mango tree makes in many ways the ideal permanent wind-break, so vitally essential to the citrus groves of the island. Thousands of seeds are being planted, and the demand for the better imported forms is rapidly increasing.
>
> During the past year nearly 200 inarches have been made from the various imported forms, and most of these are being planted on the station ground where wind-breaks are needed. Some have been distributed and others will be sent out as fast as it is deemed advisable. Various methods of grafting, budding, and inarching are being given trial, with more or less promising results. It is our desire to find if possible some rapid, simple way by which the seedlings may be grafted or budded *in situ* with more certainty of success than by any of the methods thus far used. Such a method will do away with much of the present necessary labour and danger of loss, and will give an impetus to what should be a prominent industry in the island.
>
> Shipping trials of mangos were made during the season to further determine the best methods of packing, handling, etc., and the carrying qualities of the fruit. These experiments were successful so far as keeping qualities are concerned, and it seems only a matter of time for the mango to become a valuable factor in our export trade.
>
> It was found that the best time to pick the fruit for shipping was when it began to show the faintest colour of approaching maturity. Fruit packed at this stage arrived at its destination in excellent condition and developed a flavour and quality approaching that found in the fruit ripened on the tree.
>
> Experiments were also made with the mango fruit for other purposes. At certain stages of maturity the fruit was found to make excellent jellies, butters, and sauces, and it is probable that it may be canned. More work is to be done along these lines in the coming year.
>
> The banana plantation is showing excellent growth and a number of the new varieties are now fruiting. These new types are being described and tested for their economic value. A number of kinds secured from different sections, but bearing different names, are found to be the same, thus reducing the number of varieties in the trial grounds. Varieties that have no merit are discarded.
>
> The chief and vital objection to the growing of bananas for export has been the fact that the bunches were too small. In Porto Rico a bunch with six or eight full hands is considered large. Whether this characteristic of small bunches is due to the variety, soil, or cultural methods is yet to be determined. The quality of the fruit is excellent, and the number of bunches produced on a given acreage is fairly large, so that if the size of the bunch could be increased, or more prolific varieties grown, bananas could well be raised for export.

AGRICULTURAL ENTERPRISE IN THE PITCH LAKE DISTRICT, TRINIDAD.

Some interesting details in regard to the enterprise shown by the New Trinidad Lake Asphalt Company, Limited, in the cultivation of pine-apples, oranges, cacao, and rubber, in the neighbourhood of the Pitch Lake, were contained in a letter recently received by the Imperial Commissioner of Agriculture from Mr. Robert Wright, General Agent of the Company. The following is an extract from Mr. Wright's letter:—

> We have about 30 acres in pine-apples, and last year canned 25,000 fruits, and expect to can this year in our factory here at least 40,000. We set out last October 80,000 of Red Spanish plants and about 1,000 Abbakkas with which we are experimenting. We have an orange grove consisting entirely of standard budded varieties, including a large proportion of Pomelos, amounting at present to about 3,000 trees, some of which are in their third year. We have 2,000 more in our nursery to set out in the present season.
>
> We are starting this year to put 4,000 acres of good land into cacao and rubber at the rate of about 100 acres per year if possible.
>
> You will see from the above that our interest in West Indian agriculture is very great, and any assistance that the Imperial Department can give us will be greatly appreciated.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, writing under date of May 25 last, report as follows in reference to the sales of West Indian Sea Island cotton :—

We are able to report a steadier tone about the market for West Indian Sea Island cotton, and 1,500 bales have been sold since our last report. With the exception of a few fancy lots of Barbados and St. Kitt's, at 16*d*., and several small lots of stains at 6*d*. to 8*d*., the bulk of the business has been at 14*d*. to 15*d*., comprising cotton from the following islands:—Anguilla, Antigua, Barbados, Montserrat, Nevis, St. Croix, St. Kitt's, and St. Martin.

Holders of Carolina cotton are still anxious to sell, and would accept lower prices if opportunity offered.

UNITED STATES DEPARTMENT OF AGRICULTURE AND WEST INDIAN COTTON INDUSTRY.

A memorandum recently issued by the United States Department of Agriculture in relation to the Sea Island cotton industry of the States is thus referred to by the *Demerara Chronicle* of May 15 last :—

The progress of the West Indian cotton industry, which promises to prove the salvation of several of the smaller islands, if not in course of time to become the staple industry of these colonies, is being followed with keen attention by the officials of that admirably organized department, the Board of Agriculture at Washington. In a memorandum issued by the Department a few weeks ago the American grower of Sea Island cotton is urged, in view of the progress of the industry in the West Indies, to recognize that the prices of his product depend on several factors, and that quality is more important than quantity. Sea Island cotton produced in the West Indies, the Department admits, is not only equal to the average American product, but competes with the finest quality of cotton produced in the United States —Carolina Sea Island—rather than with the inferior product. 'The West Indian industry,' it is added, 'is new, having been developed mainly since 1902, and is yet of small proportions. About 8,000 bales per annum are at present produced ; but the industry there may grow rapidly. It has already led the South Carolina planters to organize in refusing to sell seed.' The moral arrived at is that American planters should make an organized effort to raise the standard of their product, and it is pointed out that of the better grades a larger quantity can be sold than is now produced. Altogether the report is of a thoroughly encouraging nature to those interested in the industry in the West Indian colonies.

SEA ISLAND COTTON MARKET.

In their Sea Island cotton report, dated May 16 last, Messrs. Henry W. Frost & Co., of Charleston, write :—

The sales during the past week were limited to one crop lot, of 'fine' to 'fully fine' quality, sold on private terms for France. Otherwise the market is very quiet. There is still some enquiry for cotton of 'fully fine' and 'extra fine' qualities, but at prices below the views of factors, so that nothing has resulted.

On May 23, Messrs. Frost write :—

The sales reported reach only 150 bales, but they amounted absolutely to 330 bales stained and tinged cotton. The buying was for England, France, and northern mills. Cotton now in stock is held at 30c. and upwards.

The cotton report of May 16 contains the following note in relation to the area planted for the crop of the coming year :—

The acreage planted with Sea Island cotton in Carolina is reported to be about the same as last year. As regards Georgia and Florida, the reports vary very much. In some sections a very large decrease is reported, ranging from 30 to 50 per cent., while in others a moderate decrease or none at all is stated to have occurred. It is impossible to get reliable estimates as to the actual acreages planted, but from all we can gather, we would put the decrease of the cotton area in Georgia and Florida at from 10 to 20 per cent.

RICE REPORT FROM BRITISH GUIANA.

The latest fortnightly rice report (May 29 last), issued by Messrs. Sandbach, Parker & Co., of Georgetown, contains the following notes on present conditions in British Guiana :—

Rice planting proceeds steadily, and the area in cultivation now exceeds that of any previous year. With a little sunshine during the next few weeks, cultivation will be further increased, and the young plants established.

Local demand continues brisk, and prices have again advanced. Shipments to the islands [West Indian] during the fortnight amount to about 2,200 bags. The shipments, however, are now gradually falling off, island buyers being unable to place orders at present prices ruling here.

The local market is bare of cleaned rice, and stocks of paddy are getting low. We expect to see higher prices before the autumn crop is ready to be harvested.

CONFERENCE OF COTTON GROWERS AT BARBADOS.

(Continued from last issue of the *Agricultural News*.)

Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the staff of the Imperial Department of Agriculture, read a paper on the fungus diseases of cotton and their treatment.

Cotton in Barbados had suffered but slightly from fungus diseases during the past two seasons, but constant watchfulness and prompt application of remedial measures were necessary.

Anthracnose or 'pink spot' had formerly caused a certain amount of damage to the cotton crop. Spores of the fungus, carried on cotton seed, have frequently been the means of spreading the disease. The disinfection of the cotton seed, by steeping it for twenty minutes in a solution of 1 part of corrosive sublimate in 1,000 parts of water (1 oz. of corrosive sublimate in 7 gallons of water) forms a safe way of destroying the fungus without injuring the germinating power of the cotton seed itself.

Mildew is probably the most common of leaf diseases of cotton at Barbados, and is the only one which has caused any considerable damage during the past season. When cotton plants are attacked by mildew it is observed that the upper surfaces of the leaves turn reddish-brown in irregular areas, while the under sides of the diseased leaves become covered with a white, glistening felt of fungus hyphae. Spores of the fungus are produced externally, and these are washed about by rain, and also distributed by wind. Mildew most frequently makes its appearance on leaves of plants that have passed their prime, and towards the end of the season when the cotton plants are in less vigorous growth. Injured spots on the surface of the leaf form a favourable opportunity for attack, which probably accounts for the frequency with which mildew follows an attack of aphides. In view of the losses of leaves and bolls resulting from attacks of this fungus, it is evident that the time has arrived when steps should be taken to prevent the disease from becoming a further source of trouble. Experiments as to the best means of controlling the fungus have been commenced at Barbados. Spraying with Bordeaux mixture, or dusting with sulphur and lime, should keep mildew in check.

Increasing attention is now being given to spraying as a means of controlling insect pests, and it is possible that further experiments may show that various mixtures can be utilized for spraying purposes which will give effective results as fungicides as well as insecticides. Bordeaux mixture and Paris green may be used in combination, and possibly some material might be mixed with lead arsenate, which would make it effective as a fungicide, in addition to its value for insecticide purposes.

The planters of the island were asked to co-operate with the officers of the Department in carrying on trials for the purpose of ascertaining the most economical method of combating insect pests, and at the same time of preventing the appearance or spread of fungus parasites. Attacks of aphis and bad attacks of mildew not infrequently occur on the same crop of cotton, and therefore trials should be made to discover some method of treatment equally effective against both.

Mr. H. A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, read a paper which gave particulars of the insect pests affecting cotton in Barbados during 1907-8.

The cotton worm was fairly abundant throughout the season, and several severe attacks were experienced. The application of Paris green and lime, however, at the rate of 1 part of Paris green to 6 parts of lime, gave good results in keeping the worm in check. The occurrence of frequent showers of rain had at times made repeated applications necessary, and some planters believe that the large amounts used have injured the leaves of the cotton plants. Spraying with lead arsenate is also reported to have been satisfactory for this purpose.

It is expected that during the coming season, spraying will be practised on several estates in Barbados for the control of the cotton worm. Paris green and lead arsenate are the insecticides to be used.

Neither the red maggot nor the cutworm has done much damage at Barbados during the year, but aphis has been very abundant in certain localities. An effective method of treatment for attack by cutworm consists in the use of a mixture of bran, molasses, and Paris green.

The lady-birds and the lace-wing fly, though abundant in most parts of the island are lacking in others, or at least are not sufficiently numerous to control the aphis and prevent damage by their attack. The mixture (Paris green and lime) used for the cotton worm has been said to kill, by contact, the larvae of these beneficial insects. The difference in the number of lady-birds and lace-wing flies that is evident in various districts of the island, however, does not lend support to this statement, since the use of Paris green and lime is general, and if it killed beneficial insects in one locality it would do so in all.

Spraying with kerosene emulsion has been successful in controlling the cotton aphis in one of the Northern Islands. This treatment can be carried out at low cost.

One of the most troublesome of the insect pests of cotton is the hibiscus (or black) scale. This scale insect attacks not only the cotton plants, but even weeds growing wild in the fields. Prevention is the best method of treatment in the case of this pest. Estate owners should see that all old cotton is destroyed some time before the planting of the new crop. Planters on adjoining estates should, if possible, so arrange the time of clearing old cotton and planting the new crop, that there should be no cotton standing on their estates for a number of weeks. Wild plants, growing in pastures, gullies, etc., which harbour this scale insect, should be destroyed.

A parasite of the black scale was discovered last year, which is now doing excellent work towards keeping this scale insect in check in Barbados, and the parasite will probably increase in number. When old cotton is cut or pulled, it ought to be left in the field for a week or so, in order to give a greater number of the parasites an opportunity to mature and escape. The white scale is not often a serious pest, but is very troublesome at times. This insect also has its parasites, which have been found in Barbados for the first time within the past few days.

Spraying to control scale insects on cotton plants may become necessary, but clean, cultural methods, such as the destruction of old cotton some time before planting the new crop, the destruction of wild or useless plants harbouring the scales, and clean weeding in the fields, should prove sufficient, together with the beneficial work of the parasites mentioned.

Sir Daniel Morris, in summing up the various addresses remarked that the Conference had been a thoroughly successful one, and the results were likely to be of considerable benefit in regard to further efforts to establish the cotton industry on successful lines. Sir Daniel continued:—

I am glad to find in the address made by Professor d'Albuquerque that he drew special attention to the desirability of cotton being regarded as a rotation crop, and that if possible, canes and cotton should be associated in order that the large amount of vegetable matter obtained from the leaves of the canes should be returned to the land so as to maintain the supply of humus. This is in accordance with the best methods adopted in advanced agriculture. At Barbados where the soil is comparatively shallow, and where it has been continuously cultivated for more than 200 years, it is now pretty well established that cotton alone cannot be grown continuously on the same land. Another point made by Professor d'Albuquerque was that in steeping cotton seed in a solution of corrosive sublimate, owing to the fact that the seed coat so quickly absorbed the corrosive sublimate, the same solution should not be used again for disinfecting a further lot of seed. It is therefore desirable that a fresh solution should be used for every separate lot of seed. Fuller particulars in regard to this will shortly be published in the *Agricultural News.*

The most important point brought forward by Mr. Bovell was the necessity for a more general and careful system of seed selection. I referred to this in my opening remarks, and I would now reiterate my conviction that the future of the cotton industry in this island depends on the success in raising special varieties suited to the varying conditions of soil and climate existing here; also varieties capable of resisting diseases. It should need no laboured arguments to show that the same kind of cotton plant is not likely to suit the different conditions existing in two parishes such as St. Philip and St. John. Notwithstanding, I believe that with proper care and attention, St. Lucy and other leeward parishes should be capable of producing a good marketable class of cotton that would pay the cultivator, although it might not reach the highest standard of excellence in regard to fineness. There are already twelve estates where seed selection experiments are being carried on under the direction of this Department. We are prepared to extend these experiments still further, provided we can obtain a hearty co-operation of the growers, and our recommendations are carried out for several seasons consecutively.

I have already referred in my opening remarks to the very striking success that has been obtained by one planter as the result of skilful methods of seed selection This I am glad to mention is not a solitary instance. Another enterprising cultivator with nearly 500 acres under cultivation has engaged the services of a specially trained man to look after his cotton fields and carefully watch the growth of the plants, and raise special varieties to suit local conditions. On the other hand, I am sorry to say that there are a number of people at present growing cotton who, in their own interest as well as in the general interest of the island, ought not to do so, as they are evidently not prepared to devote the necessary time and attention to the crop, since they allow their fields to be infested with pests and prove a source of infection to neighbouring areas. One of the most effective means of preventing the spread of pests, and especially scale insects, is to uproot all old cotton before the new crop is planted. It would appear that this practice of keeping old cotton in fields adjoining young cotton is more prevalent at Barbados than in any other part of the West Indies. It would be a source of great satisfaction to all concerned if it were possible during the coming season to start the new crop without the possibility of it being infected with diseases from old cotton fields.

As regards seed selection, wherever a planter comes across one or more plants in a field exhibiting qualities of a desirable character, such as productiveness beyond the average, or immunity from disease where nearly all the other plants in the neighbourhood are poor or are badly attacked with disease, the seed from such plants should be carefully gathered by the planter himself, sown in a nursery and watched, in order to determine whether the special characteristics noticed previously are continued in the second generation. By repeating experiments of this nature over and over again, a local variety might be established in process of time likely to prove of great value.

The question has been asked as to whether there is a danger of over production in the supply of Sea Island cotton, and this question is one that deserves careful consideration. The present depression in prices and the difficulty in readily disposing of Sea Island cotton are due, not to over production, but to the widespread depression in trade caused by the severe financial crisis through which the United States have recently passed, which has since extended to nearly every part of the world. Two years ago we were informed that in the West Indies we could produce up to 20,000 or 30,000 bales of Sea Island cotton without seriously affecting the market. So far, we have not produced, at the outside, more than 10,000 bales, and if trade had been moderately good, there is no doubt that prices this year would have reached, on an average, 1*s*. 6*d*. per ℔. or possibly more.

As you are aware, there is to be an important Conference held at Manchester in August next, at which there will be present representative cotton growers from the West Indies as well as leading spinners of fine cotton in Lancashire. This Conference should afford an excellent opportunity for an exchange of views between growers and spinners, and it may be possible to obtain an authoritative opinion in regard to the future demand for Sea Island cotton from the West Indies. We were assured only a little more than twelve months ago by a prominent Lancashire cotton spinner, who expends annually two millions sterling in the purchase of Sea Island cotton, that if we grew a good strong cotton of uniform length, such a demand would arise as would admit of a large extension of cotton cultivation in the West Indies without risk of the supply on an average of years exceeding the demand. Until we are more fully informed, we are justified in regarding the present depression as of a temporary character, and we should not be too readily discouraged. It is reasonable that we should wait until we have all the facts before us.

In conclusion I have to express my indebtedness to the President and the members of the Agricultural Society for having called together this Conference, and I tender my hearty thanks to those present for their kindness and courtesy, and for the deep interest that has been shown in the several important matters brought forward this afternoon. I would add that I sincerely hope that the President of the Society, in his further experience with Sea Island cotton, will attain the success he so fully deserves. His case is of a somewhat special character, and I am not yet sure that the problems involved are not capable of solution either by a change of locality or by the evolution of a more hardy variety of Sea Island cotton.

A vote of thanks to Sir Daniel Morris brought the proceedings to a close.

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EDITORIAL NOTICES.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

An account is given in the editorial of the progress of the rice industry in British Guiana.

Particulars of recent experimental work with the sugar-cane in Porto Rico will be found on page 179, followed by a brief article dealing with the deterioration of sugar-cane on storage.

A good deal of attention is now being given to mango production in Porto Rico, and it is hoped to develop an export trade in this fruit (page 180). An interesting note on the same page contains particulars of a fruit-growing enterprise started by the New Trinidad Lake Asphalt Company, Ltd.

Under Cotton Notes (pp. 181-3) will be found reports on market prices, etc. as well as the concluding portion of the report of the proceedings at the Conference of Cotton Growers lately held at Barbados.

Some interesting notes on insect pests in Hawaii, California, etc., appear on page 186. The introduction from Queensland of a hymenopterous parasite, for the control of the leaf-hopper, is reported to have been attended with very satisfactory results in Hawaii.

Poultry and duck keepers should be interested in the article relating to Indian Runner ducks given on page 187. This is undoubtedly the most suitable breed of ducks for the West Indies.

Cane Juice Analysis at St. Kitt's.

With the view of enabling planters at St. Kitt's to obtain useful information as to the sucrose content of the juice of the different varieties of cane grown on their estates, arrangements have been made whereby managers can have a limited number of samples of juice analysed, free of charge, at the Government Laboratory, La Guerite, St. Kitt's, during the period that the canes in the sugar-cane experiments are being reaped. Mr. F. R. Shepherd, the Agricultural Superintendent of the island, has sent out a circular letter inviting managers to forward samples of juice, and promising a memorandum of results to each planter who takes advantage of the offer. Interesting information as to the yield and richness of juice on different estates in the island should be elicited as the result of such analyses.

Rice Meal.

Rice meal forms a valuable by-product in connexion with the rice-growing and milling industries, and it is evident that an increasing export trade in this article is being developed in British Guiana, since 1,050 tons were shipped from the colony during the first five months of the present year, as compared with 111 tons shipped in the corresponding period of 1907.

Rice meal forms a very nutritious food for cattle and milking cows, and its production on a large scale should be welcomed in a colony where the cattle trade has of late years shown such increasing development. An average sample of the meal contains about 10 per cent. of albuminoids, 7·3 per cent. of oil, and 63·3 per cent. of carbohydrates. The proportion of carbohydrates is high, and therefore, for feeding purposes, the meal is improved by the addition of a small quantity of a food rich in albuminous or flesh-forming constituents, such as cotton-seed-meal, or pea or bean meal.

Agricultural Exports from British Guiana.

The export returns for British Guiana show that the amount of sugar shipped from January 1 to the end of May of the present year, totalled 25,936 tons, as against 27,039 tons shipped during the corresponding period of 1907. The rum trade has also declined, the exports for the respective periods being 400,861 gallons and 652,977 gallons—a decrease of 252,116 gallons. Further, the shipments of molascuit and cattle food show a decline of 1,006 tons. On the other hand, the coffee exports have advanced from 100 lb. to 2,400 lb. Cacao and rice also show gratifying improvement. In regard to rice, while 3,057,399 lb. were shipped in the first five months, of 1907, the quantity sent abroad during the corresponding period of the present year amounted to 4,661,334 lb. Rubber exports have increased from 1,672 lb. to 3,042 lb., but the shipments of balata show a slight decrease. Owing principally to the new trade with Trinidad, there has been a great advance in the cattle trade, the exports for the period having increased from 387 to 789.

Proposed Experiment Station at St. Croix.

Following upon the introduction and development of the cotton industry at St. Croix, a desire has arisen among the cotton and sugar planters of the island for the establishment of an Agricultural Experiment Station in their midst, under the guidance of a scientific and practical man, who should be specially qualified to promote the interests of the cotton industry, and to give advice and assistance in regard to the several pests affecting cotton. It is thought, too, that valuable service could be rendered to the colony by such an officer in the institution of a series of sugar-cane experiments.

The establishment of such a station with the necessary officers, and probably branch stations at St. Thomas and St. John, would naturally be somewhat costly at the start, but a Committee, appointed by the Colonial Council of St. Croix, is at present enquiring into the possibilities of realizing the idea.

Plants and Coast Erosion.

More than one species of grass belonging to the genus *Spartina* have proved themselves of great value for growing on sandy or muddy shores which are especially subject to erosion, the effect of the grass being to bind and consolidate the soil, and so prevent the wearing away of the land. In British Guiana, according to an article in the *Journal* of the Board of Agriculture, *Spartina braziliensis* has been used with considerable success for preventing erosion on certain coast estates in the colony. The grass is planted in rows 6 feet apart, and 2 feet apart in the rows. The plants root firmly, and soon extend to meet each other. If covered by mud washed over them, they soon grow through it again. It is stated that on the estates in question, mangrove seedlings are planted in the grass as soon as the latter is firmly established, and these mangroves ultimately form dense thickets that effectually prevent further erosion.

Rainfall at Antigua.

Dr. Francis Watts, C.M.G., has forwarded a table showing the monthly rainfall returns from seventy stations at Antigua during 1907. The mean rainfall for the year, from all the stations, was 43·45 inches. The station at which the highest fall, 65·40 inches, was recorded is Wallings (Dam), while Wallings (Hill), and Cochranes and Thomas' came second and third with rainfalls of 60·92 and 60·60 inches respectively. The least rainfall experienced at any station, 26·20 inches, was recorded at Cocoa-nut Hall, while the next lowest, 32·65 inches, occurred at Collins. September was the month in which the greatest amount of rain fell, 7·15 inches being recorded as the mean of all the stations during that month. The rainfall of October, 6·76 inches, was the next highest. March, with only 0·55 inches of rain, was the driest month, February coming next in this respect, with 1·84 inches. The average rainfall for the past thirty-four years has been 45·75 inches, so that the rainfall for 1907 was 2·30 inches below the average.

Insurance of Cultivations against Hurricane.

The Imperial Commissioner of Agriculture has received a copy of a circular letter sent by Messrs. Henry Head & Co., Insurance Brokers, of London, to the Leeward Islands, and containing particulars of premiums payable for insuring buildings, and crops under cultivation against loss by gales and hurricanes. This subject was fully discussed in the *Agricultural News* (Vol. V, p. 129).

Premiums for the insurance of cacao and lime cultivations in the Leeward Islands are at the rate of 2 per cent. (40*s*. per cent.). For the insurance of cocoa-nuts the premium charged is 2½ (50*s*.) per cent. In the above cases, full value is paid in case of damage, and when no claim is made at the expiration of the policy, a return of ¼ (5*s*) per cent. is made. There is a special scheme of insurance for cotton during the hurricane months—July, August, September, and October. The value of the cotton crop is taken at £10 an acre, and on payment of a premium of 1 per cent. (2*s*. per acre), a planter is entitled to 37*s*. 6*d*. if his cotton is damaged in July, 42*s*. 6*d*. if it is damaged in August, 45*s*. for loss caused by hurricane in September, and 60*s*. for loss in October. On payment of a premium of 1½ per cent. (3*s*. per acre) a planter is entitled to a correspondingly higher rate of compensation.

Agricultural Education in Trinidad.

Instruction in the principles of agriculture, combined with school garden work, is being carried on in a large number of the elementary schools of Trinidad with very promising results. It has been suggested, however, that in order to secure the best results in agricultural training for the youths of the colony, the establishment of a system of compulsory education will probably be necessary. Under existing conditions, most boys and girls leave school at about thirteen or fourteen years old, just at the time, in fact, when they might enter upon a course of training in agricultural work with the greatest advantage to themselves. The uselessness of attempting to give instruction in agricultural science to boys before they have reached the above age was commented upon by Professor Carmody in a recent report on the work done at the Queen's Royal College, and the same thing practically applies to the elementary schools, where, however, the teaching is more agricultural than scientific.

The general provision of courses of instruction, such as will interest and inform the youth of the island in the principles underlying the cultivation of cacao, sugar, and other crops, is a matter of first importance in an agricultural colony such as Trinidad. The establishment in the island, of one or more Agricultural Schools similar to those started by the Imperial Department of Agriculture at St. Vincent, St. Lucia, and Dominica, would be most valuable, and that there would be suitable openings for the youths trained at the school is evident from the fact that several lads from the above schools have found employment on Trinidad estates.

INSECT NOTES.

Insect Pests in Foreign Lands.

Mr. W. W. Froggatt, F.L.S., Government Entomologist of New South Wales, started last year on a mission for the Governments of New South Wales, Queensland, South Australia, and Victoria, to investigate the fruit-fly and other insect pests, and their natural enemies, in Europe and America. Mr. Froggatt was in Barbados in January last, and was an honorary member of the West Indian Agricultural Conference. The notes given below are taken from Mr. Froggatt's Progress Reports, which have appeared in the *Journal of Agriculture* of Victoria under the title 'Insect Pests in Foreign Lands', and may be of interest to the readers of the *Agricultural News*. The lantana scrub (similar to Wild sage in the West Indies) which is a serious nuisance in Hawaii, is attacked by a number of insect pests, some of which have been introduced into the Hawaiian Islands for the express purpose of killing it. Mr. Froggatt states:—

> It has been claimed that the lantana is entirely destroyed in some districts through these insect parasites, but, though there is no doubt under certain conditions its growth has been checked and great quantities of the flowers and seed buds destroyed, the scrub is not dead and the bulk of it will have to be removed when clearing, by mechanical methods. Quite a number of different insects were propagated on lantana; e.g., two moths, a leaf mining fly, a gall-making fly, and a small leaf bug. The latter is one of the most effective insect enemies of the scrub, attacking the under-surfaces of the leaves and causing them to drop off. This bug, however, is very closely allied to the native olive bug of New South Wales, which destroys the foliage of the cultivated olive, and we could never allow it to be introduced into Australia under any conditions. The pest, however, that in my opinion, after very close observation, has effected the most destruction to the lantana, and is still at work, is the 'Maui Blight' (*Orthezia insignis*). This is one of the Mealy Bugs, and is known as a very destructive pest to the tea plant and other shrubs in India and the East. It must be stated, however, that the entomologist did not introduce this doubtful pest; it was accidentally introduced on the island of Maui, but has been widely spread all over the other islands by the ranch men, and is attacking other plants and may be a very grave plant pest to reckon with in the future. I therefore strongly advise that under no conditions should we introduce any of these insects into Australia for the purpose of killing lantana. Even if they killed every bush, our conditions of plant life are so different that it is hard to say where the pest would stop after the original host plant had died out.'

Orthezia insignis is fairly common in the West Indies, but is more conspicuous as a pest of certain useful plants than of lantana. Lantana, of which we have several species, known as sage and rock sage, is not a serious pest in these islands.

With regard to the leaf-hopper of the sugar-cane, and the effect of the introduced parasite, Mr. Froggatt states:—

> Some years ago, a small leaf-hopper (*Perkinsella saccharicida*) made its appearance as a pest in the cane fields, and, about the year 1902, swarmed in such numbers—sucking up the sap, and depositing their eggs both in the leaf stalks and the cane stems—that the whole fields were black with fumagine, and through the injuries they caused, rust and fungi damaged the tissues of the stalk. These injuries caused a great loss in the yield of juice, and Messrs. Perkins and Koebele came to Australia (whence much cane had been introduced into Hawaii) to see if they could find the home of the pest, and its parasites, if there were any. In the middle of 1904, they found this pest common in the North Queensland Plantations, and also discovered a small hymenopterous parasite destroying its eggs. The infested eggs were sent in cane stems to Honolulu, and the parasite is now so well established that the leaf hopper is kept in check. Still there is a good number of the destructive leaf hoppers to be found, and it will be interesting to watch later developments. It seems incredible that the parasites have mastered the hoppers in such a short space of time as two years, however carefully they have been spread by the entomologists of the Sugar Planters' Association. There can be no question about the value of this parasite and another since introduced from Fiji, but there may be also other agencies at work in checking leaf hoppers, one of which is the return of some of the companies to the old method of cleaning the cane fields by burning up all rubbish. Harder-stemmed varieties of cane are also not so subject to the attacks of leaf hoppers in the stem.

In California, Mr. Froggatt visited the different fruit-growing sections, and he found that the introduced parasite of the Codlin Moth has been of very little service, if any, to the apple growers.

In the orange districts it was found that scale insects were more or less kept in check by the native and introduced predaceous and parasitic insects, but that up to the present time the control by this means has not been sufficiently complete to render spraying and fumigating unnecessary, though without doubt very large numbers of scale insects are destroyed by their natural enemies.

In Louisiana it was found that the control of cattle ticks by a system of pasture rotation was effective.

Mr. Froggatt visited Texas and made a visit to Mexico. The account of the trips beyond that country has not yet been received. The report of Mr. Froggatt's visit to Cuba, Jamaica and Barbados should contain notes of interest to the readers of the *Agricultural News*.

Prize Holdings Scheme at Dominica. The Experiments Committee at Dominica propose that a Prize-Holdings Scheme in connexion with cacao cultivation shall be tried in two districts of the island, and that in awarding the prizes, the holdings shall be divided into two classes. The first class, it is proposed, shall consist of holdings over 1 acre, but not exceeding 4 acres, while the second class shall consist of holdings which shall be less than 1 acre in extent, but shall include at least 100 trees. The prizes suggested for award in the first class are £4, £2 10s., and £1 respectively, with prizes of half this value for the second class.

DUCKS.

Indian Runner Ducks.

Indian Runner ducks have been introduced into the West Indies, and wherever they are known, their great laying powers and hardy constitution cause them to be regarded with favour. Notes on the characteristics of this breed appeared in the *Agricultural News*, Vol. II, p. 218, and Vol. V, p. 190. The following particulars are taken from the *Poultry Journal* of April last:—

Indian Runners have held their own as layers of the largest number of eggs of any breed for many years, and at the present time many people keep them simply for the production of eggs on account of the fact that there is a ready sale for duck eggs in nearly every town and village—as the popular taste is decidedly in favour of a freshly laid duck egg for the breakfast table—this being considered much richer in flavour than those laid by fowls.

As table birds the Indian Runners are not profitable for sale, as their habits are so active—being similar to the Leghorn fowls in this particular—that to put on flesh at a satisfactory rate for marketing is out of the question.

For home consumption their flesh is acceptable, as they are not troublesome to rear, and since they commence to lay at such an early age they can always be hatched in December and January, so that the ducklings make a welcome diversion in the *menu* for the family, and are invariably accepted by the housewife as the finest ducks going, on account of being available when other and larger ducks cannot be had.

When kept on a free range they are splendid foragers, and during some parts of the year will get the whole of their living when allowed a good range, as they are very fond of slugs, worms, frogs, etc. They also do well in confined places, and we have known many people who have kept them in small back yards, where the birds have laid over ten months out of the twelve. It would, however, take up too much space to give the number of eggs and the various reports of those who have proved the value of these birds.

The ducks and drakes should be tightly feathered, very erect in their carriage, and have a long neck and beak, and differ from all other breeds of ducks in their manner of locomotion, for instead of waddling they run straight off, and no doubt that is one reason for their name, as they are always on the move.

In good specimens the head should be fine and very flat, more so than that of any other duck, and their eyes are very near the top of the head. Their beaks are strong and fairly broad, coming straight down the skull, and they possess a wedge-shaped head.

Many cross-bred Indian Runner ducks have been sold as pure, because the drake, when used for crossing, stamps his image upon the progeny so plainly. When once these ducks are seen their beautiful carriage and graceful movements are never forgotten.

Indian Runner ducks are a very good variety to use for crossing purposes to improve the laying qualities of other breeds. As a rule, when the Indian Runner is crossed with Aylesburies, or Pekins, the half-bred ducks do not vary ½ lb. in weight from the two latter breeds in their pure state, and we have known the introduction of fresh blood to cause the young ones to grow even heavier. To some people this would make 35 per cent. difference above what their ordinary ducks have ever made.

Although Indian Runners are small, it pays to keep them only on account of the number of eggs laid. When they were introduced to the Midland Counties and the South of England, the poulterers complained of their being so small, but their flavour is excellent, and very much like that of the wild duck. Indian Runner ducklings are very hardy, and no trouble at all to rear.

It seems a mysterious fact that such valuable ducks have been in our country for almost a century and have not spread before. No doubt they would not have done so now, had it not been for poultry literature.

JAMAICA TEA.

An account of the methods of tea cultivation, preparation of the leaves, etc., as practised on the Ramble estate, Jamaica, was contained in a paper, contributed by the Hon. H. E. Cox, owner of the estate, to the *West Indian Bulletin*, Vol. VIII, p. 254.

The Ramble is the only estate in the West Indies on which any attempt is made to produce tea on a commercial scale. It is situated in St. Ann parish, at an elevation of about 1,600 feet above sea-level. That portion of the estate on which the tea is cultivated, and does well, consists of a deep red soil, resting on a basis of white limestone. The average rainfall of the district during the past ten years has been 82·80 inches, while the average temperature throughout the year varies between 80·06° and 77·25° F. for the maximum, and 66·88° and 63·23° F. for the minimum.

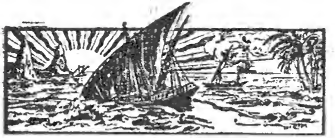
A start in the cultivation of the crop was made several years ago with 250 plants and a packet of seed from Cinchona, and this strain has been adhered to, down to the present time.

At the beginning of 1906, about 100 acres were under cultivation, (only a part being available for crop), and since then 50 acres more have been planted with seed.

The plants are propagated by means of seed. Cuttings occasionally strike, but not sufficiently well to be useful. After-cultivation simply consists in keeping the ground between the plants as clean as possible. The first return is obtained when the plants are slightly more than four years old.

The preparation of the leaves for market is a process requiring care and skill.

The *West India Committee Circular* of May 12 last, contains a report and analysis, reproduced from the *Lancet*, of a sample of tea from the Ramble estate. The following is the composition: Moisture, 7·50 per cent.; mineral matter, 5·50 per cent.; tannin, 8·22 per cent.; and theine, 1·60 per cent. The report in the *Lancet* points out that the tannin is decidedly less than that contained in either China or Indian tea, the average amount being 10 per cent. The theine, however, occurs also in smaller quantity in Jamaica tea, but this may not be a disadvantage. The first sales of tea from the Ramble estate were made in 1903. The plantation suffered considerably from the drought of last year, which destroyed about 30 acres of young plants set out the previous year, besides preventing seed from germinating.



GLEANINGS.

Mr. John R. Bovell, F.L.S., F.C.S., Agricultural Superintendent of Barbados, left for England on June 2, by R.M.S. 'Trent,' on six months' leave of absence.

The whole of the 1907-8 cotton crop of Nevis has now been gathered, and is estimated to have yielded 160,000 lb. of lint, as compared with 73,607 lb. obtained in 1906-7.

Seed, specially selected from cotton grown at Stirling Plantation, Barbados, can now be obtained, at 12c. per lb., from the Barbados Co-operative Cotton Factory, Limited.

The exports of rubber from Brazil in 1907 amounted to 36,489 tons, of which the United States took 16,811 tons, Great Britain 14,353 tons, France 2,506 tons, and Germany 2,331 tons.

From January 1 to the end of May of the present year, 171,489 lb. of balata were shipped from British Guiana, as compared with 175,576 lb. exported during the corresponding period of 1907.

By kind permission of the Hon. F. J. Clarke, C.M.G., the Attorney, a ploughing match and show of stock and sugar will be held at Poole Plantation, St. John, on June 24, under the auspices of the Barbados Agricultural Society.

In Natal the cultivation of the sugar-cane is carried on over an area of about 45,000 acres, and affords employment to some 200 Europeans and nearly 10,000 Indians and natives. (*International Sugar Journal*, May 1908.)

The amount of produce exported from Barbados, from the commencement of the crop season up to May 25 last, reached 14,531 tons of sugar and 34,035 puncheons of molasses, as compared with 16,556 tons of sugar and 40,759 puncheons of molasses for the corresponding period last year.

Tea from Java is reported as having much improved in quality and manufacture during recent years, and the best samples are now quite equal to the finest Indian and Ceylon tea. Java tea is exported chiefly to the United Kingdom, Russia, and Germany. (British *Consular Report*.)

The quantity of plantation rubber exported from the Federated Malay States during the months of January and February 1908, was 468,395 lb., compared with 270,652 lb. exported during the corresponding period of 1907. This represents an increase of 73 per cent.

Samples of lemon grass oil prepared at the Government Laboratory, Barbados, have recently been forwarded by the Imperial Commissioner of Agriculture to dealers in London for examination and report. The grass was grown at Barbados from seed imported from Cochin.

In Porto Rico the Barbados Cherry (*Malpighia glabra*) is proving of considerable merit for making jellies. The tree bears several crops a year; those at the Agricultural Experiment Station are reported as having so far borne one heavy and two light crops each season. (*Experiment Station Report*, 1907.)

The Agricultural Instructor of Nevis, writing at the end of April, reported that all old cotton plants on estates in the island were being pulled up and burnt. It was hoped to attempt earlier planting of cotton seed this year (in May and June, if possible); but, owing to lack of rain, preparation of the land was difficult with manual labour.

Professor Harrison, C.M.G., in a recent letter to the Imperial Commissioner of Agriculture, reports that the various rubber trees planted at the Experiment Station and on the farms in the North-Western District are doing very well, and showing rapid growth. About 120,000 trees have been planted during the past two or three years.

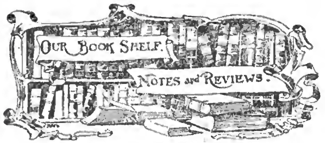
A heifer imported into St. Vincent from Nova Scotia in September 1907, when only twenty-two months old, gave birth to a bull calf at the Agricultural School, in May last. It is not usually considered advisable to breed at such an early age, but the heifer is now doing well and yielding nearly 3½ gallons of milk per day, and promises to develop into a valuable animal.

Praedial larceny has been very prevalent in Jamaica of late, and nearly all the Branch Agricultural Societies in the island have passed strong resolutions urging the amendment of the law on the subject. In regard to the frequency of theft by children, it is asked that attendance at school be made compulsory, on the ground that education would be one of the surest remedies for the practice.

Particulars contained in an article in the *Kew Bulletin* (No. 3, 1908) indicate that increasing attention is being given to banana cultivation in Egypt. The most important kind grown is the Chinese or Canary Islands banana (*Musa Cavendishii*). On good soil the plants may occupy the ground for six years. The cultivation is reported as being very lucrative.

Messrs. Macfarlane, Junior & Co., of St. Lucia, not long ago issued a circular letter to planters and others in the colony, stating their intention to start the cultivation of Sea Island cotton on an extensive scale on the Balembouche estate, and also to erect a ginnery at Castries. They invite the co-operation and support of other planters in St. Lucia. Messrs. Macfarlane have engaged Mr. W. E. Stephens, a well-known cotton planter of St. Vincent, as manager of their new enterprise.

The *Agricultural Ledger* (No. 5, 1907) deals with the seeds and oil of the Mexican poppy (*Argemone mexicana*), which is a common weed in the West Indies, belonging to the order Papaveraceae. The plant is well known by its yellow flowers, prickly leaves with white veins, and the yellow juice that exudes when the plant is broken. The seeds contain about 36 per cent. of oil which is much used in medicine in India. It is applied as a liniment, and also serves as an emetic and an aperient. The oil is further used for mixing paints, and for burning in the lamps of Indian temples. It is, however, not suitable for food purposes.


OUR BOOK SHELF.
NOTES and REVIEWS.

LITERATURE OF FURCRAEA WITH A SYNOPSIS OF THE KNOWN SPECIES. By J. R. Drummond. *Reprinted from the Eighteenth Annual Report of the Missouri Botanic Garden.*

This reprint of an interesting scientific paper forms an epitome of the present knowledge regarding the genus *Furcraea*, and was prepared in connexion with an investigation on the subject, at Kew, in 1906, by Mr. Drummond. The pamphlet is illustrated, and contains particulars of the species of *Furcraea* and *Agave* found in the West Indies.

ABC AND XYZ OF BEE CULTURE. By A.I. and E.R.Root. *Published by the A.I.Root Co., Medina, Ohio, U.S.A.* Price $1·50 post free.

The popularity and value of this well-known bee book is evidenced by the fact that the present issue forms the thirteenth edition, and brings the number of copies printed up to 116,000. While the first edition comprised only some 200 pages, continual revisions and additions necessitated by more extensive knowledge on the subject, have so increased the matter that the present issue contains 576 double-column pages. The work, as its title implies, forms a veritable encyclopaedia of everything relating to bees and bee-keeping, hives, honey, honey-plants, etc., and since it has been compiled from information collected all over the world, bee keepers, in whatever climate they are situated, will find it a valuable handbook. The alphabetical arrangement adopted with the various articles, facilitates ready reference to any particular point connected with the industry, but since such an arrangement is not the most suitable for consultation by persons about to start bee-keeping, beginners are, on page 1, referred to a list of articles which form a first course of reading on the subject. The book is abundantly illustrated, photographs representing various processes and phases of the work of bee-keeping appearing on almost every page.

It may be of interest to note that the book includes several articles contributed by Mr. W. K. Morrison, author of 'Bee-keeping in the West Indies', which was published as No. 9 in the Pamphlet Series issued by the Imperial Department of Agriculture.

THE BUILDING OF AN ISLAND. By John T. Quin, F.R.G.S., late Inspector of Schools in the Danish West Indies. *Published by the Author at Christiansted, St. Croix.*

In this volume of 106 pages, the author has given a very readable history of the geological structure of St. Croix. The book is written in a simple style, the use of technical expressions being avoided as far as possible. Further, it is rendered more useful by the inclusion of maps and representations of typical fossils, together with reproductions of photographs of various features which illustrate the geology of the island.

Two rock formations are apparent in the structure of St. Croix. Of these, the earlier is a Secondary indurated clay laid down in the Cretaceous age. This formation is known locally as 'blue beach' rock, and it occupies the eastern, the greater part of the northern, and the whole of the north-western portions of the island. Since the deposition of the clay, however, it has undergone a considerable amount of metamorphism as the result of heat and pressure. The second formation consists of Tertiary marls and limestones of the Miocene age. It overlies the older rocks to a thickness of at least 600 feet in the central, south-central, and south-western parts of the island.

Throughout the book it is shown how the conclusions arrived at are deduced from direct observation of the rocks of the island. Towards the end the author deals with the relationship of the geology of St. Croix to that of other West Indian Islands, and finally its relationship to geology in general.

EDUCATION SCHEME FOR ESTATE OVERSEERS AND MANAGERS.

It will be remembered (*Agricultural News*, Vol. VII, p. 34), that at the Agricultural Conference held at Barbados in January last, the question of the educational qualifications of overseers and managers on estates in the West Indies came up for discussion, and it was suggested that something might be done, through the Imperial Department of Agriculture, to organize a scheme of reading for young men wishing to qualify for such positions on estates, to be followed by examination for certificates of proficiency.

The Barbados Agricultural Society some time ago appointed a Special Committee to consider the subject, and to draw up a scheme of working. At the monthly meeting of the Society, held on Friday, May 29 last, the report of this Committee was presented. The report is in the shape of a scheme, published under the auspices of the Imperial Department of Agriculture, providing for a course of reading and examination in practical agriculture, the details of which were explained to the members of the Society by Sir Daniel Morris. It is proposed to hold examinations periodically at various centres in the West Indies at which candidates will have the opportunity of submitting themselves and obtaining certificates of competency. The examinations will be three in number—(1) Preliminary, in the general principles of agriculture; (2) Intermediate, in regard to insect pests and fungi; (3) Final, embracing fuller knowledge of special crops, estate management and control, diseases of plants, etc. Candidates will have about six or eight months in which to prepare themselves by reading the text-books suggested, and in addition to the written work there will be an oral examination, for the purposes of which it is hoped to secure the services of the most experienced planters in the various colonies.

In recommending the scheme to the approval of the Society, Sir Daniel said it was one which was calculated to be of great benefit to the whole island, and hoped that it would be the means of eventually securing to young men engaged in agriculture, who proved they were worthy, greater remuneration and increased comfort in their daily life. The adoption of the scheme was moved by Mr. A. Cameron, seconded by Mr. W. D. Shepherd, and carried unanimously. On the motion of Mr. J. R. Bovell it was decided to ask Sir Daniel Morris to draw up a circular-letter to be sent to the various planters in the island with a copy of the scheme.

HARVESTING AND CURING TOBACCO LEAVES.

Tobacco is a standard crop in Jamaica, and experiments in its cultivation and curing have been in progress for some time in Trinidad and St. Kitt's-Nevis. Trials of the tobacco plant have also occasionally been made in other of the West Indian Islands, and from reports received it would appear that while suitable soil and other conditions for the crop are to be found in several localities, there is great need for further knowledge and improved methods in the processes of harvesting, curing, and fermentation of the leaves. The following notes on harvesting and curing (to be followed by particulars relating to fermentation in the next issue) are taken from *Bulletin No. 15* of the Hawaiian Agricultural Station 'Cultivation of Tobacco in Hawaii,' which was reviewed in the last number of the *Agricultural News* :—

There is no hard and fast rule to indicate when the tobacco leaf is ripe. It is largely a matter of judgement to be determined by long practice and experience. The harvesting of the crop requires a great deal of skill, knowledge, and judgement. It is better to harvest under ripe than over ripe.

As the leaves are removed from the plant they should be placed in baskets or other light receptacles and taken without delay to the stringing room, where each grade should be kept separate and roughly assorted to length. The fresh leaf should never be piled in deep piles, as it heats very rapidly, and such heating has a tendency to turn the leaf black. It does not harm the leaf to wilt, but it must not be allowed to heat. Having reached the stringing room, and having been roughly assorted to length, from fifty to sixty leaves are strung with a straight needle and cotton thread, back to back and front to front, about an inch apart. A string of leaves when completed is ready to be put on the pole for curing.

The tobacco is now ready to be placed upon the racks in the curing barn A barn of the type here recommended should be filled from the bottom upward, so that the green tobacco is always on the top, and never below that which is partially cured. The air is essentially humid in the tobacco barn, and it is detrimental to have an ascending current of wet air passing through the tobacco, which is partially cured. The poles should be placed at an average distance of about 9 inches apart on the hanging rails, so that the leaves will not touch. It is very important that the leaves should not touch while hanging.

The cure depends upon the exclusion of light, thorough ventilation, and perfect control of temperature and humidity.

The object of curing is to produce a yellowing in the leaf by prolonging the death of the green cells in the leaf. The yellow colour is essential. Without it the leaf cures black. If the leaf dries too rapidly, and yellowing does not occur, it cures green. The whole curing process is a delicate one, requiring constant vigilance. The control of temperature, ventilation, and humidity are a matter of practice which will have to be determined in each locality. In general, the temperature should remain low until the leaf has wilted, and should never be allowed to go so high as to set the green colour in the leaf. The temperature should exceed humidity from 10° to 15°. If the degree of humidity approaches nearer to that of the temperature, pole rot, stem rot, white vein, moulds, and other maladies of the curing barn can not be kept out.

As soon as the web of the leaf has passed from the yellow into the brown, the temperature should be greatly increased in order to dry out the stem and veins. The heat does not injure the leaf after the colour is once set. As soon as the veins are dry, or as soon as the green colouring has disappeared in them, the leaf is cured and is ready for removal. With artificial heat the curing process may be finished in twelve to fourteen days. Without heat it will require twenty-four to twenty-eight days. The tobacco is now ready to be taken down, assorted, and bundled for fermentation.

The Hawaiian tobacco is grown without the provision of artificial shade, but the best tobacco districts are on the slopes of the higher mountains, where cloud-belts gather daily, thus providing natural shade conditions.

JAMAICA COFFEE IN SOUTH AFRICA.

The following is an extract from a letter received by the Imperial Commissioner of Agriculture from Mr. A. L. Sclater, of Helvetia, South Melsetter, Rhodesia, dated March 10 last :—

Some three or four years ago I had some correspondence with you as to the best country from which to get coffee seed for planting here, and you recommended me to get seed from Jamaica. I can only tell you how pleased I am at the result of my enquiries, as now I have several acres of beautiful trees bearing a very good crop. The oldest trees are four years old in August next, and should average 4-5 lb. of coffee per tree all round.

VANILLA PRODUCTION IN REUNION.

The British Consul in the French colony of Réunion, in his most recent report, gives the following note on the production of vanilla :—

The total production of vanilla in Réunion amounted to about 55 metric tons [1 metric ton = 2,200 lb.] as against 30 tons in the previous year. The average price was 40 fr. [1 franc = 10*d.* approx.] per kilo., (£1 12*s.* per 2·2 lb.) as against 28 fr. (£1 2*s.* 6*d.*) during 1906. This great rise in the price of vanilla has naturally had a good effect on the small planters, who were practically on the verge of bankruptcy in 1906. It is to be hoped that the price can be maintained; but there is perhaps some danger of an over production in the world's supply, and that the price of the commodity will continue to vary greatly in proportion as to whether cyclones or droughts destroy a part of the world's crop or not.

EXPERIMENT STATIONS IN EAST AFRICA.

The *Experiment Station Record* (U. S. Department of Agriculture) for March last contains the following note :—

The Portuguese Government has authorized the establishment of a series of Experiment Stations in the State of East Africa or Mozambique. This region covers nearly 300,000 square miles on the east coast, directly opposite Madagascar, and has a population of about 2,000,000. Although under the jurisdiction of Portugal, it is in large part controlled by British syndicates. Its resources are believed to be very great, but are at present largely undeveloped. Mr. O. W. Barrett, formerly Entomologist and Plant Pathologist of the Porto Rico Station, [and who was recently temporarily employed in Trinidad on work dealing with the insect pests and fungoid diseases affecting cacao in that island] has accepted a two-year appointment to organize the Stations.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of April :—

The position of the Spice and Drug markets during the month of April may be described as having been abnormally dull, which condition has been partly attributed in some quarters to the unusually cold and wintry weather experienced throughout the month, added to the intervention of the Easter holidays ; but the most serious cause seems to be the general scarcity of money, and in this connexion the *Pharmaceutical Journal* makes the following comment : 'We appear now to be feeling the after effects of the enormous amount of money which was unavoidably lost to the world during the Boer and Russo-Japanese wars, to which must be added the immense loss of capital through the earthquakes in America and the West Indies.'

In the matter of West Indian products the following are the chief items :—

GINGER.

At the spice auction on April 1, the offerings of Jamaica amounted to 238 packages, of which 20 were disposed of at the following rates : Fair bright, 78*s*., ordinary small dark, 52*s*. per cwt. Privately, it was stated, that a good business had been effected in fine quality at 85*s*. to 86*s*., and for medium at 60*s*. to 65*s*. A week later Jamaica was slow of sale, 70 barrels and 46 bags being offered and bought in at from 60*s*. to 80*s*. for good washed. Some 220 packages of Calicut were offered, but there was very little demand, 10 bags only finding purchasers. At the auction on the 15th, 28 barrels of dull washed Jamaica were sold at 63*s*. 6*d*. per cwt. At the last sale on the 29th, Jamaica was in fair supply, some 240 packages being offered, of which, however, only 10 sold at from 52*s*. to 60*s*. for good ordinary to dull washed. Some 360 packages of Cochin and Calicut were also offered and 3 sold. Bold selected cut Cochin was bought in at 90*s*., bold native cut at from 55*s*. to 60*s*., and good brown washed Calicut at 45*s*. per cwt.

NUTMEGS, MACE, AND PIMENTO.

At the spice sale on April 8, over 300 packages of West Indian nutmegs were offered and disposed of at advanced prices on previous rates, but no further quotations have been made during the rest of the month. Mace remained steady throughout the month. At the last spice sale on the 29th, some 16 packages of West Indian were offered and sold at the following rates : fair to good red, 1*s*. 3*d*. to 1*s*. 4*d*., and broken at 1*s*. 1*d*. per ℔. The offerings of Penang, Java, and Macassar were bought in at the following rates : 1*s*. 7*d*. to 1*s*. 8*d*. per ℔. for dull Penang, 2*s*. for good Java, and 1*s*. 1*d*. for wild Macassar. Pimento has occupied a very quiet position during the month. At the first auction only a few bags were sold at 2⅝*d*. per ℔. for fair, but some 60 bags of siftings were disposed of without reserve at from 1¼*d*. to 1¾*d*. per ℔. On the 8th, 143 bags were offered and all were bought in, and at the last auction on the 29th, out of 590 bags offered, only 40 were sold at 2⅛*d*. to 2¼*d*. per ℔.

ARROWROOT.

At the spice auction on April 1, 247 barrels of St. Vincent were brought forward, 57 of which were sold without reserve, realizing from 2*d*. to 2¼*d*. per ℔. for fair manufacturing ; and at the last sale on the 29th, out of the 189 barrels of St. Vincent offered, 90 were disposed of at the following reduced rates : 1⅞*d*. to 2*d*. for fair manufacturing. Natal, of which 20 cases were offered, was all bought in at 4½*d*. per ℔.

SARSAPARILLA.

At the first drug sale, sarsaparilla was in good demand, all the offerings being disposed of. Grey Jamaica was represented by 15 bales, which sold at the following rates : 1*s*. 2*d*. to 2*s*. per ℔. for part coarse and dark to fair fibrous. Of 36 bales of Lima-Jamaica, the following prices were obtained : 7 bales of coarse to fair, slightly roughish, fetched 1*s*. 6*d*. to 1*s*. 7*d*. per ℔.; 8 other bales 1*s*. 5*d*., and 21 bales at from 1*s*. 4*d*. to 1*s*. 6*d*. for sound, and 1*s*. to 1*s*. 3*d*. for damaged. Five bales of native Jamaica were disposed of at 1*s*. for dull red, and for fair bright red and yellow, 1*s*. 1*d*. to 1*s*. 2*d*., and 1*s*. 3*d*. for good red. Two bales of fair red, but oil-damaged, realized 10*d*. to 1*s*. 1*d*. per ℔., and 1*s*. to 1*s*. 2*d*. per ℔. was paid for 10 bales of Guayaquil. Towards the end of the month small sales of grey Jamaica were made at 2*s*. 1*d*. to 2*s*. 2*d*. per ℔., and it was announced that further large consignments of genuine grey Jamaica and Lima-Jamaica would be offered at the first auction in May.

LIME JUICE, KOLA, TAMARINDS, ETC.

At the beginning of the month it was reported that lime juice was arriving more freely from the West Indies than hitherto. Fair raw realized 1*s*. 3*d*. per gallon. A week later 1*s*. 4*d*. to 1*s*. 5*d*. was asked for good flavoured raw West Indian. At the auction on the 8th, 15 bags of dark kola were offered and disposed of at 2*d*. per ℔. At the same sale, new Barbados tamarinds were sold at 19*s*. per cwt., duty paid. A fortnight later new West Indian were reported to be arriving freely, amounting, it was said, to 388 barrels from Antigua, and 75 barrels from Barbados. During the month musk seed from Java was offered at 3*d*. to 3½*d*. per ℔., but it was stated that the cultivation was not remunerative at the present prices, in consequence of which the imports have practically ceased.

CACAO EXPORTS FROM TRINIDAD.

The following particulars in relation to the exports of cacao from Trinidad during the early months of the present year were given in the *Proceedings of the Agricultural Society of Trinidad and Tobago* (April 1908):—

The exports of Trinidad cacao for the quarter ending March 31, 1908, were 19,967,706 ℔., as against 11,265,856 ℔. for the corresponding period of 1907. In the list of countries importing Trinidad cacao, France takes the leading position, with 10,884,160 ℔., the United States which purchased 5,779,872 ℔., coming second. The United Kingdom, which took 2,384,592 ℔. comes third, while Holland imported 442,288 ℔. of Trinidad cacao. Only 123,872 ℔. are scheduled as having been exported to Canada, but this figure is no indication of the trade, as the cacao business of the Dominion is almost entirely done through New York. In connexion with the important business in cacao with the United States, it seems strange that the market price of the article there should not appear in the West Indian public telegrams. This is more observable when it is noted that regular New York sugar quotations are furnished.

Shipments of Trinidad cacao during April last were 3,591,084 ℔., of which 2,951,084 ℔. went to the United States, 915,320 ℔. to France, and 496,533 ℔. to the United Kingdom.

MARKET REPORTS.

London,—May 26, 1908, 'The West India Committee Circular; Messrs. E. A. de Pass & Co., May 15, 1908; Messrs. Kearton, Piper & Co., May 26, 1908.

Arrowroot—1⅞*d*. to 2¾*d*.
Balata—Sheet, 2/3 to 2/4; block, 1/7½ to 1/8 per ℔.
Bees'-wax—Good quality, £7 10*s*. to £7 12*s*. 6*d*. per cwt.
Cacao—Trinidad, 67/- to 85/- per cwt.; Grenada, 61/- to 67/- per cwt.
Coffee—Santos, 29*s*. 7½*d*.; Jamaica, 37/- to 52/- per cwt.
Copra—West Indian, £16 per ton.
Cotton—St. Vincent, 15*d*. to 17*d*.; Barbados, 15*d*. to 17½*d*.; St. Kitt's, 15*d*. to 17½*d*.; Montserrat, 15*d*. to 16½*d*. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—4/6 to 5/- per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/6 each.
  Grape Fruit—6/- to 10/- per box.
  Oranges—Jamaica, 6/- to 7/- per box.
Fustic—£3 10*s*. to £4 10*s*. per ton.
Ginger—51/- to 80/.
Honey—20*s*. to 33*s*. per cwt.
Isinglass—West India lump, 1/7 to 2/3 per ℔.; cake, 11*d*. to 1/- per ℔.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £13 10*s*. per cask of 108 gallons; Distilled oil, 1/10 to 1*s*. 11*d*. per ℔.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10*s*. to £4 5*s*. per ton; roots, £2 10*s*. to £3 10*s*. per ton.
Mace—No quotations.
Nutmegs—66's to 68's, 8*d*. to 8½*d*.; 76's, 6*d*.; 91's, 5*d*.; 105's to 118's, 4¼*d*.; 121's, 3½*d*.; 149's, 3¾*d*.
Pimento—Quiet; 2⅛*d*. to 2¼*d*.
Rum—Jamaica, 3/3 to 8/-; Demerara, 1/6 per gallon; Trinidad, no quotations.
Sugar—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 15*s*. 7*d*.; Molasses, no quotations.

New York,—May 29, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 13½c. to 15c.; Grenada, 13c. to 15½c.; Trinidad, 13c. to 16c.; Jamaica, 11½c. to 12c. per ℔.
Cocoa-nuts—Jamaica, select, $22·00 to $23·00; culls, no quotations; Trinidad, $18·50; culls, $10·50 per M.
Coffee—Jamaica, good washed, 9c. to 11c.; good ordinary, 7¾c. to 8¼c.
Ginger—12½c. to 14c. per ℔.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 45c. to 48c., dry flint per ℔.
Grape Fruit—Jamaicas, $2·25 to $2·70 per box and $4·50 to $6·00 per barrel.
Limes—Dominica, $7·50 per barrel.
Mace—29c. to 33c. per ℔.
Nutmegs—110's, 10¼c. to 10½c. per ℔.
Oranges—Jamaica, $1·70 to $3·00 per barrel.
Pimento—4⅜c. to 4½c. per ℔.
Sugar—Centrifugals, 96°, 4·42c.; Muscovados, 89°, 3·86c.; Molasses, 89°, 3·61c. per ℔., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., June 2, 1908; Messrs. T. S. Garraway & Co., June 9, 1908

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 ℔.
Cacao—Dominica, $14·00 to $15·00 per 100 ℔.
Cocoa-nuts—$14·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 ℔.
Hay—$1·40 to $1·50 per 100 ℔.
Manures—Nitrate of soda, $62·60 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $12·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—Choice, 19c.; Fancy, 21c. per gallon.
Onions—Bermuda loose, $1·21 to $1·75 per 100 ℔.
Potatos, English—$2·00 to $3·00 per 160 ℔.
Peas—Split, $6·40; Canada, $3·20 per bag.
Rice—Demerara, $5·85 to $6·10 (180 ℔.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 ℔.
Sugar—Muscovado, 89°, $2·00 per 100 ℔., package included; Dark crystals, $2·50; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—May 16, 1908, Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $9·50 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 16c. to 18c. per ℔.
Cassava—80c.
Cassava Starch—$9·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 12c. to 13c.; Jamaica, 12c. per ℔.
Dhal—$5·75 to $6·00 per bag of 168 ℔.
Eddos—96c. per barrel.
Molasses—Yellow, 19c.; Dark, no quotations.
Onions—Madeira, 3c. to 3½c.; Lisbon, 3c. to 3½c. per ℔.; Dutch, no quotations.
Plantains—40c. to 60c. per bunch.
Potatos,—English, $3·00 to $3·50 per barrel.
Potatos, Sweet—Barbados, $1·32 per bag.
Rice—Ballam, $6·40; Creole, $5·75 for good; Seeta, $6·00 per bag.
Split Peas—$6·00 to $6·10 per bag (210 lb.); Lisbon, $4·50.
Tannias—$1·68 per bag.
Yams—White, $2·00; Buck, $2·64 per bag.
Sugar—Dark crystals, $2·70 to $3·00; Yellow, $3·50 to $3·10; White, $3·70 to $3·80; Molasses, $2·00 to $2·60 per 100 ℔. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·75 per M.
———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—May 30, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$13·00 to $14·00 per fanega.
Cocoa-nuts—$22·00 per M., f.o.b.
Cocoa-nut Oil—60c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·50 to $2·75 per 100 ℔.
Dhal—$5·00 to $5·15 per 2-bushel bag.
Onions—$1·75 to $1·90 per 100 ℔. (retail).
Potatos, English—$1·75 to $1·90 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
Split Peas—$5·90 to $6·00 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 ℔.

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Observations on the work of Sugar-cane Mills and Deductions to be drawn therefrom.

UNDER the above title Dr. Francis Watts, C.M.G., has contributed to the *West Indian Bulletin* (Vol. IX, p. 85) a lengthy paper of which we here give the main points.

The first point dealt with is the manner of ascertaining and stating the efficiency of the work done by a mill in crushing canes. It is shown that the statement of the percentage of juice expressed from the cane is not satisfactory, because canes, at different times and in different localities contain different quantities of juice, hence a percentage which may represent good work under some conditions may correspond with bad work under others. The statement of the amount of sugar remaining in the megass is also regarded as unsatisfactory owing to the varying amount of sugar present in different canes.

A suggestion by Mr. Lely (Chemist to the Antigua Central Factory) to calculate the amount of juice* remaining in the megass in proportion to the fibre, and to state this in terms corresponding to 100 parts of fibre, is accepted as the most satisfactory method of expressing the efficiency of the mill work. This factor permits of the comparison of mills working under the most diverse conditions, as regards the quality of the cane or juice, or the character of the mills. Similarly, a single mill in a muscovado sugar works can, on this principle, be directly compared with a modern mill using maceration.

Considering the work done at the Gunthorpe's Factory from this point of view, it was found that in 1907, the sucrose remaining in the megass corresponded to 80·4 parts of first mill juice per 100 parts of fibre. In the 1906 working, 103·2 parts of first mill juice per 100 parts of fibre were left in the megass. The amount of maceration water used was 21·1 per cent. in 1907, and 9·1 per cent. in 1906. Figures obtained from Java, and relating to the work of ninety-six mills during the season of 1906, show that, on the average, the first mill juice remaining in the megass amounted to no more than 62·7 per 100 parts of fibre, the average quantity of maceration water used being 14 per cent. In the work of five Government sugar mills in Queensland during 1906, the mill juice left in the megass varied from 53·4 to 94·3 per 100 parts of fibre. In the first case 35·0 per cent. of maceration water was used, and in the second case, only 10·9 per cent.

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* The juice is assumed to have the same sucrose content as the juice from the first mill, where multiple crushing is employed. Hence the expression 'first mill juice per 100 of fibre' is frequently made use of in this paper.

These figures afford an immediate and direct means of comparing the efficiency of the work in different parts of the world under diverse conditions. From this, the improvement effected in 1907 in the work done at Gunthorpe's, Antigua, can be measured, and the general efficiency of the mill can be compared with others. In this manner its work is found to be somewhat less perfect than the average work done in Java, and it is also less perfect than the work of three of the Queensland mills, but better than two.

As Gunthorpe's mill lost 80·4 parts of juice per 100 parts of fibre, while the Java mills lost 62·7, a difference of 17·7, and as the average canes dealt with at Antigua contained 15 per cent. of fibre, it follows that Gunthorpe's mill will be required to give 2·9 parts more juice per 100 of cane to ensure its work being up to the Java average.

Attempts were made to ascertain the efficiency of Bendal's mill, where there is a cane shredder followed by a three-roller mill, and also to ascertain the efficiency of single mills in muscovado works.

Considerable difficulty was experienced in obtaining representative figures from muscovado works, for it was found that the work of the mills varied very greatly according to the manner in which the canes are fed to the mill, and as work of an experimental nature usually attracted particular attention, the work done at the time when samples of megass were being taken was usually far better than the average work of the mills day by day.

At Bendal's the result of a number of trials showed that the megass contained from 120 to 140 parts of juice per 100 of fibre, and averaged 131.

The figures from the muscavado estates were irregular, ranging from 113 to 174, and the opinion is expressed that most of the figures are below what may be expected on average work, day by day.

The view is strongly held that analyses of samples of cane fail to give correct ideas as to the average composition of the canes dealt with throughout the season by a factory. It is shown that good results can be calculated from the analyses of the juice and of the megass, and it is claimed that these represent much more accurately the composition of the canes than can be ascertained by analyses of samples of the latter.

Working with the figures available for Gunthorpe's Factory, it is shown that the canes during the three last seasons have contained:—

	1905.	1906.	1907.
Sucrose per 100 parts of cane	15·25	14·13	14·39
Fibre " " " " "	15·05	15·20	15·07

The amount of juice in the canes and in the sugars during the three seasons was as follows:—

	1905.	1906.	1907.
Average juice per 100 parts of cane	80·6	80·3	79·6
Average juice expressed by the mills	65·1	64·2	67·1
Average juice left in megass	15·5	16·1	12·5

Figures are put forward to show that the megass from mills where maceration is employed contains a certain amount of water in excess of the normal amount proper to dry crushed megass, and it is calculated that at Gunthorpe's this amount is equal approximately to 5 per cent. of the weight of the megass. In calculating the composition of the cane, as given above, allowance is made for this, (but alternative calculations are also given wherein this correction is not made).

Attention is directed to the existence in the cane of 'water other than juice,' and a conventional method is adopted for ascertaining the composition of the so-called 'average' juice and of estimating the amount which is present in the cane.

One point which appears to be clearly brought out is that the average canes dealt with at Gunthorpe's, Antigua, taking into account all the canes that are crushed, contain a large proportion of fibre (15 per cent.), and a relatively small quantity of juice (80 per cent.). Yet it is noted, from figures given in an appendix to the paper, that 1 ton of 96° crystals was made from 9·62 tons of cane, taking the average of the work of the season 1907.

It would be extremely interesting and useful if similar information could be compiled in respect to the canes and the sugar industry of other West Indian Islands.

SUGAR INDUSTRY.

Seedling Canes in British Guiana.

At a recent meeting of the British Guiana Board of Agriculture, Professor J. B. Harrison, C.M.G., submitted a return containing particulars of the area that had been planted with seedling canes in the colony for 1908-9.

Professor Harrison stated that returns had been received in reference to every estate in the colony. There were thirty-eight plantations which were growing new varieties of sugar-cane in British Guiana, the areas ranging from 2 to 6,320 acres on the different estates. In the whole colony there were 32,698 acres of new canes under cultivation; 20,872 in Demerara, 8,544 in Berbice, and 3,282 in Essequebo. At the time the Board started work, the area under seedling canes was about 4,000 acres. In 1906-7 this had increased to 21,000 acres, and in the season 1907-8 it reached 28,000 acres.

In reference to the new varieties most largely planted, there were 9,819 acres of D. 109 under cultivation; the seedling D. 625 was planted on 9,662 acres, B. 208 on 5,258 acres, D. 145 on 3,282 acres, and B. 147 on 1,652 acres. Smaller areas of many other varieties were also under cultivation. Of the total area under seedling canes, 25,500 acres, or over 77 per cent., were planted with varieties raised in the Botanic Gardens at British Guiana, while 7,198 acres, or 22 per cent. of the whole area, were planted with Barbados seedlings.

Manurial Experiments with Sugar-cane in the Leeward Islands.

Pamphlet 51 in the series issued by the Imperial Department of Agriculture contains the results of the manurial experiments with sugar-cane carried on in Antigua and St. Kitt's during 1906-7.

In consequence of the conclusive results that have been obtained in the experiments with plant canes, carried on during the previous six years, these have now been discontinued, and two series of experiments with ratoon canes, known as the 'Old Series' and the 'New Series' respectively, are now in progress.

The old series of experiments has been carried on for seven years, each experiment having been repeated thirty-seven times, and very fairly concordant results have been obtained. In this series, dressings of manure similar to those applied to the ratoons were, in the case of each plot, given to the plant canes preceding the ratoons. The experiments show fairly conclusively that nitrogen is the manurial constituent of the greatest value to ratoon canes, and that the requirements of the crop will be met by the use of from 2 to 2¾ cwt. of sulphate of ammonia per acre, or of 2½ to 3½ cwt. of nitrate of soda, given in one application. It appears that potash is doubtfully remunerative, and if used, the quantity need not exceed 20 lb. of potash (40 lb. of sulphate of potash) per acre. The application of phosphates was not attended with economical results.

These conclusions presuppose that when the land was prepared for plant canes it was adequately manured with about 20 tons of good pen manure per acre, or its equivalent, and are applicable to the average conditions of soil and climate obtaining in the Leeward Islands.

In the new series of experiments with ratoon canes, the artificial manures are applied to ratoons following plant canes that received no artificial manures. For the year 1906-7, remunerative returns were obtained only in the case of four experiments out of the thirty-three. The best result was that given by the plot which received 60 lb. of nitrogen as nitrate of soda (equal to about 380 lb. of nitrate). The experiments in this new series have only been in progress for three seasons, and the results have been to a certain extent interfered with by drought. Generally speaking, the application of the manures in this series has not proved remunerative, but it will be necessary to continue the experiments for a few years longer before any definite conclusions can be drawn from the results.

Sugar Industry in Java.

The British Consul at Java reports that the year 1907 was a highly favourable one for the sugar industry and that cane growers obtained very satisfactory returns.

The area planted with sugar-cane in Java for the 1907 crop was greater than usual, being 281,750 acres, as compared with 260,810 acres planted for the 1906 crop. As the result of congenial weather conditions and favourable rainfall, however, the sugar return per acre proved to be the highest yet obtained in the island. The total crop reached 1,144,383 tons, as against 1,046,691 tons yielded in 1906, while the average return per acre was 4·06 tons, compared with 4·01 tons obtained in 1906. The number of mills working in the island, both in 1906 and in 1907, was 176.

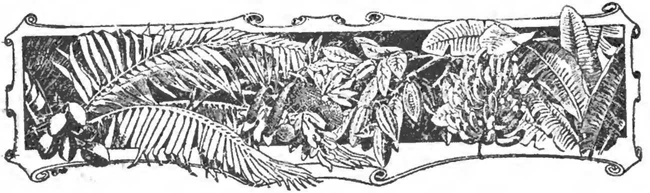
The Consul states that the chief factors which, under the propitious weather conditions, helped to bring about this satisfactory state of affairs were the continuation of scientific systematic cultivation, the careful selection of the cane based on the experience of past years, and the rational and frequent application of fertilizers, together with the closest attention to the prevention of root disease of the cane.

The Experiment Stations of the island are continuing to do good work in producing new varieties of cane which not only give an increased yield of sugar, but are also more impervious to the root disease.

The trade returns of Java show an increase of over 200,000 tons in the sugar exports for 1907, as compared with the shipments for 1906. The exports to the United States increased from 192,178 tons in 1906 to 309,419 tons in 1907, while the sugar sent to British India advanced from 111,527 tons in 1906 to 311,569 tons in 1907. The United Kingdom took 12,261 tons of sugar from Java in 1907, as compared with only 4,123 tons in 1906. On the other hand, shipments to Australia, and to various European countries, show a considerable decline.

On account of excessive rainfall during the early growing period of the canes, it is stated that the 1908 crop is expected to be later and less productive than that of 1907.

An example of the assistance afforded to the farming community of the United States by the Government Department of Agriculture is mentioned in a recent British *Consular Report*. Less than ten years ago the Department spent about £2,000 on the introduction into the country of the cultivation of durum wheat. This variety of wheat is especially suitable for growing in districts where the rainfall is slight. At the present time the annual value of the durum wheat crop of the States is about **£6,000,000.**



WEST INDIAN FRUIT.

GUAVA JELLY.

The fact that guava fruits decay so readily on reaching a stage of ripeness renders their shipment on a commercial scale to outside countries almost impossible. The culture of the guava, however, need not be the less remunerative on this account, since well-prepared guava jelly finds such a ready market in all countries where it is once known, that its production may well become a substantial source of profit. This question is referred to in the course of an article 'Some Opportunities in Subtropical Fruit Growing,' that appeared in the *Yearbook* of the U.S. Department of Agriculture, 1905, and which contains the following account of the methods employed in Florida in the preparation of jelly and other guava conserves:—

> The guavas are picked up every morning and taken to the factory, where they are weighed, and later sorted to remove any bad fruits that may have been delivered. The guavas are turned into a boiler for preliminary cooking, after which the juice is filtered through a heavy, coarse fabric, which prevents any of the pulp from passing through. The juice is afterwards bottled or put into jars, sterilized by means of heat, sealed, and kept in these vessels until the jelly is wanted on the market. The quantity desired is then taken from the containers, sugar is added, and the juice is boiled long enough to give the proper colour, when it is placed in the jelly containers and sent to the market. The fancy product is put up in glass jars, sealed and labelled properly, while the cheaper grades are placed in paper boxes, in which form the jelly is sold as cheap as 20c. per lb. retail.
>
> In addition to guava jelly, another product is sometimes made that resembles the jelly in firmness, but which might be briefly described as jellied marmalade. This preparation is known by several names, as guava cheese, guava paste, etc. It is moulded in various cubical or oblong shapes and wrapped in oiled paper. The formulas for making it are very numerous, but in general it is composed of the best of the guava pulp, containing sufficient juice to cause it to become firm like jelly when properly cooked with the requisite amount of sugar. In addition to jelly and cheese, wine and vinegar are also made from the guava, both of which are said to be excellent.
>
> Canned guavas are rarely seen outside of the guava belt, but they make a fine appearance and are delicious. To prepare them for canning, the firm, ripe fruits are chosen, pared and quartered, and then treated like any other fruit. The more fastidious housekeepers choose the thick-meated guavas, and in addition to paring the fruits, they also remove the seeds. The fruit that has become too ripe to make good jelly, or is not firm enough for canning, may still be used for marmalade. For immediate table use, sliced guavas with sugar and cream make an excellent dessert.

The Montserrat Preserving Industry Company, whose products were referred to in the *Agricultural News*, Vol. VII, p. 52, make a specialty of guava conserves in different forms.

COCOA-NUTS IN PORTO RICO.

It is believed that there are good prospects of profit in connexion with the cocoa-nut industry of Porto Rico, and the report of the Experiment Station of the island (1907) states that cocoa-nut plantations are increasing in number, while in addition a good deal of general planting of cocoa-nut trees is also being done. The accompanying notes are taken from the report:—

> Efforts have been made by officers at the Experiment Station to obtain some data in regard to the number of fruits a tree will bear during the year. Though many countings have been made, the variation has been found to be so great that as yet it is impossible to give any accurate figures. Trees have been observed bearing as many as 225 nuts at one time, and a crop of from 125 to 150 nuts has been found very common in the section where the cocoa-nut trees appear to flourish best. Most authors reporting on this subject give an average of 120 to 125 nuts for the whole year, but from data gathered here it would seem as though there is a higher average in the better cocoa-nut sections of Porto Rico.
>
> Cultivation, fertilization, and seed selection are found to have an important influence on the rapidity of development of a cocoa-nut plantation, as well as on its productiveness. From data obtained it can be strongly recommended to those starting new groves that they look carefully to the physical condition of their soil, the selection of their seed, and the cultivation and fertilization of the trees. By paying attention to these points they may gain from one to three years in the development of the plantations.
>
> Thus far none of the dreaded cocoa-nut diseases have been observed or reported. There are some minor diseases present in the groves, but they are almost entirely due to neglect of the trees and are not to be feared by the careful grower.

THE GRAFTING OF CACAO.

The propagation of cacao by the method of grafting was tried in Jamaica some years ago. Approach grafting of cacao has also been practised in Dominica for the past few years with the most promising results, and similar trials have been made in Trinidad, and more recently at St. Lucia. A paper, read at the West Indian Agricultural Conference of 1907 by Mr. Joseph Jones, Curator of the Dominica Botanic Station, on this subject, appeared in the *West Indian Bulletin*, Vol. VIII, p. 187, and was reprinted in the *Agricultural News*, Vol. VII, p. 85.

The advantages that would be obtained by the use of grafting methods in the propagation of cacao as compared with the raising of young plants from seed are similar to those that have resulted in the case of the mango. Owing to cross-fertilization, few seedlings are like the parent plant, and hence it is that seed from a tree which shows excellent bearing and disease-resisting qualities cannot be relied upon to produce young plants as good as the parent tree. A cacao tree produced by a vegetative method of reproduction such as grafting, however, necessarily resembles the parent in all its characteristics, and the best types may therefore be selected for reproductive purposes, with every assurance that they will be perpetuated.

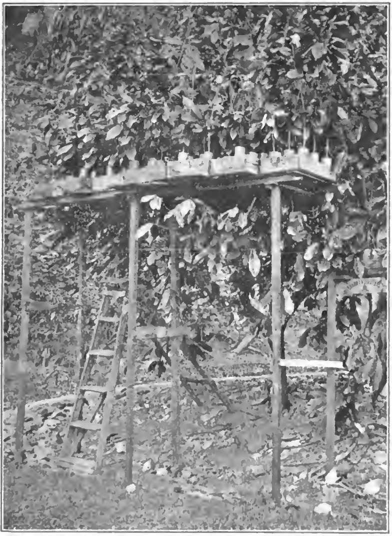


FIG. 3. GRAFTING CACAO BY APPROACH AT DOMINICA BOTANIC STATION.

A field of grafted cacao plants would naturally cost more at the start than a field of seedling plants, but provided that the former are grafted from prolific and disease-resisting parent trees, the additional cost would be more than recovered by the increased returns obtained per acre. A quicker return, too, would probably be obtained, since grafted plants should fruit earlier than seedlings. If fields were restricted to plants of one selected strain, the beans would all require the same degree of fermentation, and this operation would consequently be simplified. Another effect which, it is believed, would result from the adoption of grafting methods in the propagation of cacao is that the grafting may tend to dwarf the plants. This would be an advantage in islands which suffer much from windy weather.

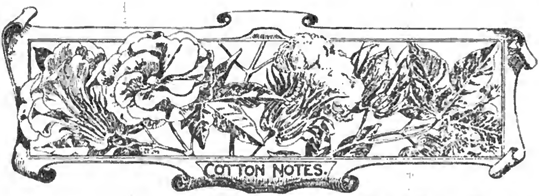
In the work done at the Dominica Botanic Station, Alligator cacao (*Theobroma pentagona*) has been worked on Forastero stocks, and a number of plants of an excellent type of Forastero have also been grafted on hardy Calabacillo stocks. The method followed is indicated in the accompanying illustration, (Fig. 3) and was described in the *Agricultural News* of March 21 last. A tree of good type is selected, and rough stages are erected round it at varying heights in such positions as to obtain a maximum of young shoots which have already been grown in nurseries in bamboo pots. The pots are placed on the stage, young shoots of the cacao trees, which are of the same age and thickness as the stocks, are carefully denuded of their leaves at the point where they are to be fitted to the stock, a portion of the bark is removed with a sharp knife from both scion and stock, and the two are carefully bound together with garden tying.

A small piece of bark is cut from the stem of the scion below the graft so as to make it more dependent on the stock and to hasten its union. The average time required for the process of grafting cacao may be placed at about ten weeks. Over 200 grafted plants were in 1906-7 obtained from two cacao trees of selected type in the Dominica Botanic Garden.

A photographic illustration will be given in the next issue of the *Agricultural News* of a grafted cacao tree at Dominica, which at two and a half years old (when the photograph was taken) was bearing a crop of sixty pods of cacao.

Timber Trade of British Guiana.

The British Guiana correspondent of the *West India Committee Circular* reports that the lumber industry of the colony is coming in for a good deal of attention just now, owing to the increasing price of imported American timbers. A complete sawing plant has just been imported for the North-West district, two mills are at work on the Corentyne coast, and others are being erected elsewhere. The Berbice steam saw-mill has recently secured an order from a well known London firm of furniture manufacturers for 1,000,000 feet of crabwood (*Carapa guianensis*), the local mahogany, a wood which is hard and durable and takes a fine polish.


COTTON NOTES.

SEA ISLAND COTTON MARKET.

In their report, dated May 30 last, on the sales of cotton from the Sea Islands, Messrs. Henry W. Frost & Co., of Charleston, write :—

> The sales for the past week consisted of 100 bales of 'fully fine' quality, at 30c., and two planters' crops at 32c. to 35c., making 156 bales in all. The buying was for England and France.
>
> The unsold stock consists of about 100 bales of odd bags, classing 'fine' to 'fully fine,' and 100 bales 'fully fine,' which are held for 30c. The balance are planters' crops, held at 32c. and upwards. Although the factors are anxious to sell they continue to hold firmly for the above prices.

On June 6, Messrs. Frost report :—

> The sales this week consisted of 70 bales odd bags, classing from 'stained' to 'fine,' at various prices, the buying being for England ; otherwise the market is quiet and unchanged.

The market report of May 30 contains the following note in relation to crop prospects for the coming season :—

> The weather has been generally favourable in all three States—Carolina, Georgia, and Florida, and the crop has made fair progress.

ST. VINCENT COTTON CROP.

The *St. Vincent Times* reports that the harvesting of the cotton crop of the island was completed early in June. During the season the Central Cotton Factory has ginned 774 bales. Last year the output of the factory was 700 bales. The total cotton crop of the island (Sea Island and Marie Galante) is estimated to be of the value of £30,787.

For the season 1907-8, the area planted with Sea Island cotton was 3,200 acres, or rather more than twice the acreage (1,535) planted in 1906-7. The yield of lint obtained per acre in the past season, however, was but 135 lb., as compared with 175 lb. per acre obtained in 1906-7. Mr. W. N. Sands, the Agricultural Superintendent of St. Vincent, considers that this reduced yield is due to several co-operating causes, chief among them being: the exceptionally wet weather experienced in December, the planting of poor or shallow lands, failure to apply sufficient manure to lands already cropped for two or three seasons, planting too early or too late in the season, insufficient labour to pick the crop, and attacks of the black scale insect and leaf-blister mite.

Sea Island cotton cultivation was taken up on a fairly large scale in some of the Grenadine islands, notably at Bequia, Mustique and Ballieeaux. The returns were very satisfactory. In other islets such as Union, Canouan, and Mayreau, the Marie Galante variety is still grown. In the Grenadines generally, wherever there is a good depth of soil, Sea Island cotton can be grown to advantage.

The selection and disinfection of seed, both for export and for local use, was undertaken by the Imperial Department of Agriculture in readiness for the planting season. Well-grown seed was charged at cost price only. A total amount of 17,431 lb. of seed was treated in this way.

Cotton plant selection experiments were continued during the season on three estates viz. Argyle, Concord and Montrose. The seed from the selected plants of the previous year having been sown in nurseries, the work was much easier. On each estate the seed-cotton produced was very even in character, of good quality, and true to the type originally selected.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date June 9, with reference to the sales of West Indian Sea Island cotton on the Liverpool market :—

> A fair business has been done in West Indian Sea Island cotton since our last report, and about 700 to 800 bales have been sold at steady prices.
>
> A very large proportion of the sales consist of stained cotton, at 6*d.* to 9*d.* per lb., the remainder being chiefly St. Kitts, Barbados, Antigua, Montserrat, and St. Croix, at prices ranging from 11*d.* to 15*d.*, with a few extra lots at 15½*d.* to 16*d.*
>
> Holders of Carolina cotton are offering from America at easier prices without finding buyers.

COTTON LEGISLATION IN ST. CROIX.

In order to prevent, as far as possible, the spread of scale insects, leaf-blister mite, and other pests of the cotton plant, an Ordinance has lately been passed in St. Croix which makes it compulsory for growers to pull up and burn their cotton plants as soon as the second picking of the crop has taken place.

The Colonial Council of St. Croix will each year appoint a commission of five cotton growers, whose duty it will be to supervise the carrying out of the Ordinance.

In the case of growers who may neglect to clear their cotton fields as prescribed, the Commission will fix a time within which the clearing must be done by the cultivator, and if the latter still refuses to carry out the law, the work will be done under the supervision of the Commission, the cost of the operation being charged to the cotton grower.

FRUIT PRESERVED IN BRINE.

The latest *Report* of the British Consul at Naples contains the following note on the export trade in cherries preserved in brine :—

> A new agricultural product, which has reached very important proportions as an export, consists of cherries preserved in the following manner. They are first placed in the fumes of sulphur and then packed in casks with very strong brine. The chief place of export is to the United States where, as they pay no duty, they compete with the home-grown fruit. On arrival the fruit is sorted out, the best being sold for the purpose of flavouring some of the various stimulants which, under different names, form the specialty of American bars, the second best are preserved in brandy in the usual way, and the remainder are used for the general purposes of confectionery. The extraordinary expansion of the trade may be judged by the following figures : 1904, £2,783 ; 1906, £14,584 : 1907, £30,125. The figures for 1905 are not available, as the export of cherries was in that year not placed under a separate head in the returns, but it will be observed that the increase in 1907 over 1906 was more than 100 per cent.

A brief article appeared in the *Agricultural News* (Vol. VI, p. 186) on a somewhat similar method of preserving citrons, which is adopted in Greece.

QUANTITY AND QUALITY OF GOATS' MILK.

A chapter in a recently published book 'The Case for the Goat' (a brief review of which appears on page 205 of the present issue) deals with the quantity and quality of the milk that goat-keepers may expect from their stock. In regard to the question of quantity, the following particulars as to the yields given by one or two individual animals may be of interest :—

> The Secretary of the Goat Society has himself supervised the weighing and measuring of the yield of a Swiss goat at Great Waltham. He found the daily average, from September 1 to September 4 inclusive, to be 10 lb. 5 oz., or more than a gallon per day. This animal had been in milk for more than five months. Its yield is, of course, more than customary, but there are plenty of goats in Great Britain which give 5 gallons a week, and thousands yielding a quantity only slightly smaller. Undoubtedly, the average milk yields in England have risen largely during the past few years. As far back as 1899, however, a herd of five goats, kept by Mr. C. A. Gates, of Guildford, produced in a year over 3 tons of milk. The daily average per goat for nine months was over 5 pints. It may be mentioned, too, that the American Milch Goat Association will not admit to its register a goat giving less than a quart per day. As an especially noteworthy instance of the milk-yielding capacity of the 'poor man's cow' the author of 'La Chèvre' states that he knew of an Alpine goat which, when newly kidded and as a result of a remarkable appetite and special feeding, gave 8 litres [about 7 quarts] daily for three weeks.

In composition the milk of the goat is richer than that of the cow. A statement of analysis, taken from a standard book, shows that an average sample of goat's milk contains 4·29 per cent. albuminoids, 4·78 per cent. fat, and 4·46 milk sugar, as against 3·55 per cent. albuminoids, 3·69 per cent. of fat, and 4·88 per cent. of milk sugar contained in cow's milk.

CORN CULTURE IN THE UNITED STATES.

The United States Department of Agriculture has inaugurated a method of assisting farmers in the Southern States by what is known as the Farmers' Co-operative Demonstration Work. This system is one by which the established principles of successful agriculture are demonstrated directly to the farmers on their own farms by trained and practical officers of the Department. The co-operating farmers undertake to work a portion of their land strictly in accordance with the instructions of one of these officers, the latter visiting the farm at periodic intervals to see that the instructions are carried out, and to give any necessary advice or help. *Farmers' Bulletin 319*, which gives an account of this work, states that up to February 1908, no less than 12,000 of these 'demonstration farms' were under supervision.

Improved methods of cultivation of the maize crop form one of the lines of work taken up by the organization, as the following extracts from the pamphlet will show :—

> Corn is the main grain food grown for farm stock, and can be successfully raised in most portions of the South. Any considerable increase in its annual production would have a marked effect upon the value of the unused lands for grazing purposes and would perceptibly increase the income of the farms. Notwithstanding this, its cultivation has been singularly neglected until the average yield per acre has fallen below the profit line in many States. Even at the high value per bushel allowed, the corn crop in many of the Southern States does not pay a living wage or a fair rent value for the land.
>
> There is abundant proof that large and profitable crops of corn can be produced in the South by the use of the best seed and improved methods. The planting of low-grade seed in a shallow and impoverished seed bed is responsible in the main for deficient yields and quality. However, to secure the best results other reforms must be made, such as better drainage, adjustment of distances between the rows, and between the stalks in the rows, to meet the requirements of soil and climate, intensive cultivation of the crop, and the use of cowpeas in the corn.
>
> The Farmers' Co-operative Demonstration Work includes instruction along all of these lines, and the results have been most encouraging. Our investigations show that not even 1 per cent. of the lands in the South planted to corn are ploughed deeply enough at breaking, that they have not sufficient humus, and that they are not given the proper tillage to produce the best crop. Seed is so generally defective that only about one-third of so-called good seed is suitable for planting if maximum yields are expected. Along these practical lines we are conducting co-operative demonstrations, with the object of increasing the corn crop in the South Atlantic and Gulf States at least threefold per acre without additional cost. A system of seed selection for improving the quality, and increasing the yield, and methods of storage for the preservation of vitality, is outlined, detailed instructions being given on application.
>
> The object of the average farmer in planting corn is to secure the largest crop of good corn possible under the conditions. The selection of the seed is very important.
>
> For the best results corn should be selected in the field in the same way as the Japanese select their rice seed before the harvest.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

Vol. VII. SATURDAY, JUNE 27, 1908. No. 161.

NOTES AND COMMENTS.

Contents of Present Issue.

A method of expressing the efficiency of sugar-cane mills, in terms of the amount of sucrose remaining in the megass per 100 parts of fibre, is discussed in the editorial, and the work of the Antigua Central Factory compared with that of mills in other countries.

The area under seedling canes in British Guiana continues to extend each season. The manurial experiments (1906-7) with sugar-cane in the Leeward Islands indicate that nitrogen is the constituent of greatest value to ratoon canes. The year 1907 was a highly favourable one for the sugar industry in Java (page 195).

An account of the methods followed, in the guava-growing districts of Florida, in the preparation of jelly and other conserves of guava, will be found on page 196.

The method of grafting cacao by approach, as practised at the Dominica Botanic Station, is described and illustrated in an interesting article on page 197.

Cotton Notes (page 198) include market reports, together with a résumé of the crop conditions and results in St. Vincent, during the past season. The destruction of cotton plants, after the picking of the second crop, has been made compulsory in St. Croix, in the hope of preventing the spread of insect pests.

Plant Importation into Jamaica.

In order to protect the coffee plantations of Jamaica against the possible introduction of the leaf disease (*Hemileia vastatrix*), a law was passed in 1887 prohibiting the importation into the island of any seeds or plants from Natal, South India, Ceylon, Mauritius, Java, and Fiji

On the recommendation of the various agricultural bodies of Jamaica, and the Imperial Commissioner of Agriculture, however, this prohibition has recently been withdrawn, since it is now generally agreed that there no longer exists danger of infection to the coffee plantations, and a demand has arisen in Jamaica for a supply of Para rubber seeds which can best be obtained from Ceylon.

All plants and seeds brought into the island, however, have to be fumigated at the expense of the importer.

Molasses for Farm Stock.

Results of investigations as to the value of molasses as a food for stock are contained in *Bulletin 118*, lately issued by the Massachusetts Agricultural Experiment Station. The point emphasized in the conclusions drawn from this work is that it is uneconomical to feed a ration containing an unduly high proportion of molasses, since the excess of carbohydrates contained in the molasses tends to reduce the digestibility of the other constituents of the ration. The same result has been noticed in experiments carried out at other stations. Molasses is best given in combination with some fodder food, such as hay, and together with a certain amount of an albuminous food, as cotton-cake meal or pea meal; 2 or 3 ℔. of molasses per day are recommended as a suitable allowance for cows and horses. In the Massachusetts experiments the molasses proved a valuable condiment, and induced the animals to eat inferior and unpalatable fodder which otherwise they would have refused.

'Pre-cooling' as a Preventive of Fruit Decay.

Fruit growers in California have, in the past, suffered great loss through the decay of their produce while in transit to markets in the Eastern States. Some three years ago the United States Department of Agriculture appointed an expert to make a thorough study of the causes of the trouble, with the view to devising a remedy. It was found that the loss was greatest in the hot season, and that fruit picked and packed at a very high temperature frequently travelled 1,000 miles on the journey before the ice with which it was packed had lowered the temperature to a degree below that at which it was possible for decay to take place. By that time, naturally, much of the riper fruit was already spoiled.

In order to cool the fruit before starting therefore, a method has been devised for exhausting the air in the car before loading, and replacing it by air made cool by passing over ice. By this system of 'pre-cooling,' a carload of fruit can, at a very small cost and in a few hours, be reduced to a temperature at which there is no danger of decay. Cooling plants are being installed at the chief California railway stations.

Rainfall at Dominica.

According to the statement of rainfall returns for Dominica during 1907, the highest rainfall for the year was recorded at Lancashire Station, this being 247·59 inches. The station recording the second highest rainfall was Glean Manioc, which received 227·25 inches. Batalie received the least amount of rain—40·26 inches, Macoucherie coming next in this respect with 54·26 inches. September was the month in which the maximum rainfall was registered at most stations, but July, August, and December were also wet months. The highest monthly figure recorded, however, was 45·35 inches of rain, experienced at Castle Bruce in November. February and March were the driest months. The mean rainfall of Dominica for the whole year, based on the returns from thirty-three stations, was 108·51 inches, this being 20 inches less than that registered in 1906.

◆

Sugar Industry in Reunion.

The sugar crop of Réunion, for the year 1907 reached 37,500 metric tons [1 metric ton = 2,200 lb.], of which 17,685 tons had been exported up to the end of November last. The net price obtained by the planter varied from 17*s.* 6*d.* to 18*s.* 4*d.* per 220 lb. of sugar. In common with many other cane-growing countries, Réunion suffered much from drought towards the end of 1907, and this is expected to reduce the yield from the present season's crop.

In his latest report, the British Consul at Réunion refers to the bad organization that exists in connexion with the sugar industry of the island, which is carried on with out-of-date machinery, and largely by the aid of capital borrowed, at a high rate of interest, on the security of the coming crop. With improved conditions, the Consul expresses his opinion that cane sugar cultivation in Réunion would become a remunerative industry.

◆

Rubber Extraction from Small Trees.

The Secretary of the West India Committee has forwarded to the Imperial Commissioner of Agriculture a copy of a letter received by him from Dr. W. A. Dyes, of Manchester, dealing with the extraction of rubber from very young trees and rubber-yielding bushes.

Dr. Dyes states that by a method of extraction lately invented, it is possible to obtain rubber of a high degree of purity from small trees and bushes, the latex of which contains no more than 12 to 15 per cent. of rubber. He further mentions that one factory has already been established on the continent, which is working successfully by this system, the necessary rubber plants being imported from Mexico and Africa.

Dr. Dyes is anxious to receive from the West Indies, samples of plants (small trees or bushes,) containing from 10 to 15 per cent. of rubber.

If planters who are interested in this matter, and who are able to obtain a supply of plants such as are required, will communicate with the Imperial Commissioner of Agriculture, Barbados, arrangements could be made to forward samples (of from 5 to 10 lb. in weight) for purposes of experiment by Dr. Dyes.

Agricultural Science Lectures at Trinidad.

In further reference to the subject of Agricultural education at Trinidad (*Agricultural News*, Vol. VII, p. 185) it may be mentioned that a circular has been received from the Education Department of that colony containing details of a course of lectures on agricultural science that are being given at the Port-of-Spain Training School, and repeated at the San Fernando Training School. The course consists of thirty-six lectures, each of one hour's duration, and one lecture will be given weekly at each centre. The subjects treated in the first twelve lectures include the soil and its formation, the structure and function of the different plant members, e.g., stems, leaves, etc.; fruits, seeds, and their dispersal; the processes of absorption and assimilation, as well as an elementary study of fungi, and the diseases of cacao and the sugar-cane.

In the second term the lecturer will devote attention to the preparation of potting soil and vegetable beds, seed sowing and treatment of seedlings, propagation by cuttings, grafting, budding, etc, manuring and mulching, as well as the elementary study of insects, and the preparation of insecticides and fungicides.

The final twelve lectures will deal with the formation and maintenance of a school garden and herbarium, the principles and practice of pruning, draining, tillage, etc., and also further instruction in regard to insects and fungi.

There is to be an examination on the work done at the end of each twelve lectures.

◆

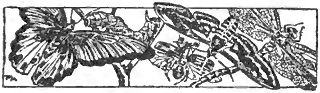
Minor Agricultural Industries of Java.

Apart from sugar, the chief agricultural products of Java are tea, coffee, tobacco, cinchona bark, copra, and rice. The latest report of the British Consul in the island shows that the tea industry is in a prosperous condition, the exports of this commodity increasing annually. The shipments were 27,517,615 lb. in 1906, and reached 29,286,402 lb. in 1907. Larger areas have of late been planted with tea, and the cost of production is low, since labour is so cheap. The average quality of the Java product is said to be not quite so good as that of China or Indian tea, but some grades compare very favourably with tea grown in the latter countries.

Both Arabian and Liberian coffee are grown in Java, the former in much larger quantity than the latter. The crop has tended to decline during the past three years, but the estimate for the crop of 1908 indicates a large increase in the output. About 19,000 tons of coffee were exported during 1907.

Weather conditions had an unfavourable effect on the rice and tobacco crops of 1907, the yields, in the case of both crops, being diminished in quantity and quality. Rice is usually grown in Java in regular rotation with the sugar-cane, but it is stated that during recent years the area under rice culture has annually declined, and the land is being used for other produce.

The exports of cinchona bark were 8,540 tons in 1907, as against 6,565 tons shipped in 1906.



INSECT NOTES.

Poisoned Bait for Grasshoppers.

Circular No. 84 of the Bureau of Entomology of the U.S. Department of Agriculture consists of an account, written in popular language, of the life-history and habits of two species of grasshoppers (*Melanoplus differentialis* and *M. bivittatus*) that are responsible for a large amount of devastation in alfalfa fields in the States, as well as of methods for the destruction of these pests.

Although alfalfa is not a crop of great importance in the West Indies, grasshoppers are often troublesome and sometimes serious pests. Readers of the *Agricultural News* may be interested in one of the remedies given in the above-mentioned circular under the heading of 'Poisoned Baits':—

> What has come to be known as the 'Criddle mixture' is giving most satisfactory results in dealing with grasshoppers on the ranches of both the United States and Canada. The mixture is composed of half a barrel of fresh horse droppings in which is mixed a pound each of salt and Paris green. If the horse droppings are not fresh the salt is dissolved in water and mixed with the manure and poison. When this mixture is scattered freely about where the grasshoppers are abundant they seem to be attracted to it, for they devour it readily and are poisoned thereby. Dr. James Fletcher, Entomologist for the Dominion of Canada, cites an instance where this mixture had been scattered freely around the edges of a field, and states that this particular field stood out as a green patch in a brown plain, as it was situated in the midst of fields where nothing had been done to destroy the grasshoppers. This 'Criddle mixture' now seems preferable to the poisoned bran remedy that has given, and still continues to give, beneficial results, for it is less expensive than the latter and less likely to poison other animal life.

Sleeping Sickness and Its Prevention.

The French Colonial Minister has caused the distribution, throughout French Africa, of a document drawn up by the Inspector-General of the colonial sanitary service setting forth the measures to be employed for the prevention of sleeping sickness. The following concise summary of the contents of this document (taken from the London *Times* of May 22) may be of interest, since it refers to a tropical disease which has of late attracted a good deal of attention:—

> The species of the tse-tse fly known as *Glossina palpalis* is perhaps the only one capable of transmitting the disease. Still, until more is known on the subject, there is reason to regard all stinging insects as suspicious.
>
> The first symptoms of the disease are a fever on which quinine has no effect, a swelling of the glands of the neck and jaw, blotches on the skin, and severe pain following the slightest blow or even a pinching of the skin. The sleep from which the disease takes its name seldom occurs before the final stage of the malady, patients at first mostly suffering from sleeplessness. There is no danger of such a patient communicating the disease to others except where the district is infested by stinging flies.
>
> The means of averting the disease are—first, to avoid the marshy places favoured by the insect; secondly, the destruction of the fly itself; thirdly, the protection of healthy as well as infected persons from the sting; fourthly, to prevent the introduction of diseased persons into villages that have escaped infection; and fifthly, to transfer infected villages to districts where the tse-tse fly does not exist. For the destruction of the fly it is necessary to cut down the brushwood for about 500 metres from the water and to deprive the insect of its usual food—namely, the blood of vertebrates, without which it cannot live for longer than three days. The brushwood should be cut down, or better still, burnt down at night, when the fly does not sting. The chrysalis dies when exposed to the sun, even under five centimetres of earth. Europeans should make their camps and houses at a distance from rivers and streams, and separate from those of the natives, who should be warned to draw their supplies of water only at night, when the fly is inactive. The houses should be closed with wire gratings. Infected persons should be isolated and treated with injections of atoxyl, a preparation of arsenic which causes the disappearance of the parasites from the blood, at least for a time. These injections exercise a tonic effect upon the patient. In general it is not necessary to inject more than 50 centigrammes of atoxyl in small doses frequently repeated.

UTILIZATION OF POND MUD.

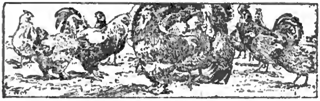
Ponds frequently occur in corners of fields on estates, and when these are being cleared out, the mud taken from the bottom can frequently be utilized with advantage, although the composition of the sediment will naturally depend upon the character of the surrounding soil and the nature of the pond.

The composition of one or two samples of mud from ponds in England, together with notes as to the uses of the material, were given in an article that appeared in a late number of the *Journal* of the Board of Agriculture of Great Britain. A sample taken from a pond at Kew contained 45·15 per cent. of moisture, 0·439 per cent. of nitrogen, 0·27 per cent. of phosphoric acid, 12·04 per cent. of lime, together with magnesia and other alkalies, equal to 0·97 per cent. A specimen of pond mud from Nottinghamshire contained 78·81 per cent. of moisture, 0·862 per cent. of nitrogen, 0·32 per cent. of phosphoric acid, and 7·79 per cent. of lime.

Where a pond is situated at the lower end of a field, it is likely to receive, after rain, surface washings which may possess considerable manurial value. On the other hand, if the pond is one formed by springs, the sediment may be of little or no value.

At Kew the pond mud is used for general gardening purposes, and as a mulch for beds, borders, and trees. It has also given good results as a top dressing for grass. Before use, the water should be allowed to drain away, and the mud broken up.

It is pointed out that the effect of such material is as much of a mechanical as of a chemical nature, and if used on land of a lighter or drier texture, would assist in improving its physical condition. On heavy land it probably would not be so successful.



POULTRY NOTES.

The Feeding of Chickens.

At the Dominica Agricultural School, by the help of a Cyphers 120-egg incubator, and a brooder, the keeping of poultry and the raising of chickens, though at present carried on in an experimental way, have yet become a source of profit. The breeds kept are Barred Plymouth Rocks, Buff Orpingtons, White Leghorns, and Indian Games, together with crosses. For five weeks after hatching, the chickens are kept in the brooder, which is heated for the first three weeks. The following particulars as to the method of feeding found most suitable in rearing the chickens, are given in the report (1906-7) on the Agricultural School:—

All food supplied to the chicks during the five weeks while in the brooder was scattered among the litter, so as to cause the birds to scratch for their food. This is beyond doubt one of the most essential points to be observed in successful rearing, as it causes the chick to take a fair amount of exercise in obtaining its food, which tends to keep the young bird in a healthy condition. During the time the chicks occupied the brooder, fresh green food was supplied twice a day. This consisted of spinach, alfafa, and cabbage leaves, the whole of which was passed through a closely set clover cutter, and thoroughly mixed up previous to being fed.

After the first three weeks, it is better to supply the green food whole by suspending it within easy reach of the chicks. Dry food should be given four or five times each day. 'A little and often' should be the rule; if the chicks are fed but twice a day it causes them to stuff their crops and become lazy. Such birds seldom survive the twelfth week. On the other hand, if a little food is supplied about every three hours, the chicks are kept in constant exercise.

Incorrect feeding is usually the cause of mortality among chicks, this generally resulting from diarrhoea, or from the birds becoming crop-bound.

The following dietary can be fully recommended: The first two weeks, egg and bread should be given. The egg should be boiled until it is quite hard, and the whole of it—yolk, white and shell—minced and thoroughly mixed with stale bread. This may be given the first thing in the morning, and the last thing at night. During the day, coarse oatmeal should be given (raw) every three hours.

From the time the chicks are two days old, a limited amount of animal food should always be given. This may be supplied in the form of wood-ants, maggots, worms, etc. In the event of these being unobtainable, minced raw meat, scraps and ground bone should be given. During the third, fourth, and fifth weeks, brown rice may be substituted for the egg and bread, this being fed alternately with the oatmeal. After this time, any of the following foods may be given: finely ground corn, ground oats, barley, buckwheat, etc., or cornmeal mixed with hot water and made into a crumbly mass, so that when thrown to the birds it falls apart easily. A good supply of grit must always be obtainable; broken oyster shell is an excellent material.

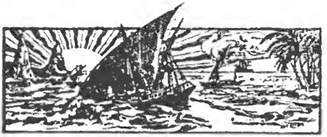
FERMENTATION OF TOBACCO.

The particulars given below on the fermentation of tobacco leaves, are taken from *Bulletin 15* of the Hawaiian Agricultural Experiment Station, a pamphlet issued to show the possibilities of tobacco growing on a commercial scale in Hawaii, and also to give information as to the best methods of carrying out the various operations connected with the preparation of the crop. They form a continuation of the notes on harvesting and curing the leaves that appeared in the last issue of the *Agricultural News*. After curing has taken place, the tobacco should be sorted into lots of thick, thin, and medium leaves respectively. The different grades are then tied up into bunches containing from fifty to a hundred leaves, and in order to undergo the process of fermentation, these bunches are piled up into heaps on the floor of the room specially provided for the purpose.

The fermentation should follow immediately after the grading and sorting process, as the tobacco is then in the best condition. A much better fermentation can be secured immediately than after a delay of weeks or months. The tobacco is taken from the sorting room to the fermenting room. If the tobacco is in proper condition when it is placed in the pile—that is, if the leaf contains 20 to 25 per cent. of moisture—a rise in temperature will begin at once. The heap of fermenting tobacco leaves should be covered over with a tarpaulin or rubber blanket, excluding all air and retaining all moisture. No weight should be applied. When the building of the fermenting heap has been finished, the temperature of the room should be heated to from 85° to 95°, and should be kept at that figure until the pile of fermenting tobacco reaches the same degree of heat. As the temperature in the pile of tobacco increases above 90°, the air temperature should be permitted to remain about 10° lower than the increasing temperature of the pile. The higher the temperatures in the fermenting pile the darker the colour of the finished leaf. Under no circumstances must the temperature of the fermenting tobacco be permitted to rise above 136° F. As soon as the temperature in the middle of the pile, which is the hottest, reaches 100° F., the pile should be torn down and re-arranged on the floor near by. The leaves that previously formed the bottom, sides, and tops are placed in the centre of the new pile, while the leaves that were in the centre of the first heap, become the outside, bottom, and top of the second pile. This process should be continued throughout the various re-arrangements of the pile. An important point is to maintain a constant degree of humidity in the fermenting room. The air in the fermenting room should never be permitted to become dry, but should always show from 85° to 90° of humidity, irrespective of the temperature.

In the first stages of fermentation, large quantities of ammonia are set free, and there is a considerable evolution of ammonia throughout the whole fermentation process. As soon as the fermentation is complete, the tobacco is ready for the final sorting.

A second fermentation takes place in the bale. It is a slower one and the temperatures do not rise very high, but it seems to be quite important in fixing character in the leaf. This second fermentation mellows the tobacco and tends to improve the aroma. The bales should be placed in the warehouse for at least six months before selling. The warehouse should be clean, dry, and cool, and no other goods stored with the tobacco.



GLEANINGS.

The British Guiana Board of Agriculture has granted a sum of $1,340 in support of country agricultural shows in the colony, during the coming year.

During 1907-8, rubber plants to the number of 47,000 were sold by the Botanical Department of British Guiana. The amount realized from the sale was $1,487.

Four pedigree male goats are offered for sale at the Agricultural School, Dominica. Full particulars can be obtained on application to the Officer-in-Charge of the School.

The number of banana stems exported from Jamaica during 1907-8 was 15,847,590. Of these the United States took 14,505,911 bunches, while 1,239,500 bunches were shipped to the United Kingdom.

As the result of examination at St. Kitt's Grammar School, four Agricultural Scholarships, of the Imperial Department of Agriculture, have been awarded to E. Berridge, R. Perkins, E. Arnold, and J. Fletcher, respectively.

The production of copra in Java has varied immensely of late years. In 1907, the output reached 68,000 tons, one of the largest crops on record; but owing to excessive rains the quality was not satisfactory, and there was a great fall in price during the year. (British *Consular Report.*)

An Ayshire bull and a Devonshire bull have lately been imported into St. Lucia from Canada by the Agricultural Society of the island. The animals are described as fine and well-bred and in splendid condition, and will be retained for service in the colony.

The Jamaica Board of Agriculture at a recent meeting passed unanimously a resolution, expressing the appreciation felt by the members for the long and valuable services of the Hon. W. Fawcett, B.Sc., as Director of Gardens and Plantations during the past twenty-one years, and as a member of the Board of Agriculture since its formation.

Messrs. Sandbach, Parker & Co's rice report, dated June 12, states that the season's rice crop of British Guiana is now well established, and with suitable weather there is good prospect of excellent returns. Planting is still in progress in some districts, and the weather conditions, so far, have been most favourable.

The British Government has decided to establish a Bureau for the collection and distribution of information with regard to sleeping sickness. One-fourth of the cost will be borne by the Soudan Government. The duties of the Director of the Bureau will for the present be undertaken by Dr. A. G. Bagshawe, of the Uganda Medical Staff. (London *Times.*)

According to the Jamaica *Daily Telegraph*, about three-fourths of the tobacco crop of the island had been harvested by the first week of May. It was stated that the portion of the crop still remaining in the field was in danger of being lost, owing to dry weather. The *Telegraph* also states that there has been over-production of tobacco in Jamaica during the past year.

The Hon. E. J. Cameron, Administrator of St. Vincent, has written to the Imperial Commissioner of Agriculture, expressing the thanks of the Government of the island for a collection of diagrams of plants and animals, as well as framed pictures of Their Majesties the King and Queen, lately presented to the St. Vincent Agricultural School by Sir Daniel Morris.

Considerable efforts are now being made in Brazil to develop the cultivation of various kinds of fruits. The grape vine is largely grown, and several growers have lately visited Italy in order to acquire a knowledge of the best methods of treatment. Increasing attention is also being given to the production of bananas, oranges, and figs. There is reported to be a promising future for the establishment of canning factories, and also for the production of wine.

A French agricultural journal contains an article on a method of preserving eggs which is being practised in Italy, and which consists of covering the eggs with a coating of lard, so as to stop the pores of the shell and prevent the entrance of air, the eggs being afterwards packed in shavings, care being taken that they shall not touch each other. The packing room must be as dry as possible. It is stated that eggs treated in this manner when quite fresh have kept in perfect condition for a year.

The returns for 1907 show a slight increase in the pine-apple exports from the Azores to Hamburgh and London. While in 1906, 402,870 pines were shipped to London, the number sent in 1907 reached 413,208. The number exported to Hamburgh was 878,617 in 1906, and 893,450 in 1907. The freight from the Azores to London is 2*s.* 3*d.* per case, and to Hamburgh 3*s.* 3*d.* per case. A case contains from nine to twelve pine-apples, and it is stated that a price of from 1*s.* 1*d.* to 1*s.* 4*d.* per fruit was realized. (British *Consular Report.*)

The *Moniteur Official du Commerce* (Paris) reports that deposits of potash salts have recently been discovered near Soultz in Alsace, extending through a district covering about 78 square miles. A superior deposit of the salts (which are estimated to contain from 30 to 43 per cent. of chloride of potash) 1 metre in thickness, and an inferior deposit 5 metres in thickness, have been found at a depth of from 500 to 700 metres. It is stated that the first factory for turning out the salts has been established, and that shafts are being sunk.

Seeds of *Musa Gilletii* obtained from the Botanic Gardens of the Congo Free State, were in 1905 distributed by the Imperial Commissioner of Agriculture to a number of the West Indian Botanic Stations. This is a species of banana indigenous to the Congo district, and is described as a very handsome plant. In reply to enquiries recently made at the Botanic Stations to which the seed was sent, it was in all cases stated that this seed showed very poor germinating power. At one or two Stations a few plants were raised, but these soon died out. A single plant, however, is reported as being in existence at the Grenada Botanic Station.

Our Book Shelf.
Notes and Reviews.

THE PRINCIPLES OF AGRICULTURE. By Peter M. de Weever, Master at the Government Industrial School, British Guiana *Published by the 'Argosy' Company Ltd., Georgetown.*

Now that increasing attention is being given to teaching agricultural science in the elementary schools of the West Indies and British Guiana, there naturally arises a demand on the part of the teachers for a handbook indicating the lines on which the subject should be taught. The above book, it is stated by the author in the preface, was written with the object of meeting this need so far as the elementary school teachers of British Guiana are concerned. It should certainly prove useful for the purpose, since it contains, within the compass of 87 pages, a large amount of elementary information on soils, their formation, and the methods of treatment (draining, liming, manuring, etc.) which improve their agricultural value, plant life and growth, the proximate constituents of plants and animals, etc. The latter part of the book deals with practical demonstration work before the class, and contains notes on a number of experiments which illustrate the principles conveyed in the lessons.

LE CACAOYER AU CONGO FRANCAIS. By C. Chalot and M. Luc. *Published by Augustin Challamel, 17 Rue Jacob, Paris.*

The output of cacao from the French Congo has shown a continuous increase during the past ten years. In 1896 the exports were 5,143 kilograms [1 kilogram = 2·2 lb.]; three years later the shipments had advanced to 23,249 kilos., and in 1902 they reached 58,398 kilos., while in 1904 the total cacao exports were 91,092 kilos.

On account of the increasing importance of the industry, and in order to give useful and reliable information as to the best methods of cultivation, preparation of the produce, etc., to those engaged in cacao culture, the above book of sixty pages has been written by two officials connected with the Department of Agriculture of French Congo.

The book gives an account of the different varieties of cacao, with their comparative values, and discusses the most suitable conditions of soil and climate, methods of raising and planting young seedlings, the question of shelter, both from sun and wind, and the later treatment of the plantation, pruning, raising young trees, etc. Finally, directions are given as to harvesting, fermenting, drying, and shipping the crop. The book is illustrated with reproductions of photographs and with diagrams.

THE CASE FOR THE GOAT. By 'Home Counties.' Published by George Routledge & Sons, Limited, London. Price 3s. 6d.

This book, it is stated in the introduction, has been written in the hope of removing some of the ignorance and prejudice that exist in the minds of many in regard to the goat, and with the object of spreading a better knowledge of the valuable milk-yielding properties of these useful and cheaply-kept animals. Interesting data is given as to the amount of milk yielded by goats, while it is pointed out that this milk is not only much richer, but also more digestible than cow's milk, and therefore more suitable as a food for children. The management and feeding of goats, and the relative milking value of the different breeds are also discussed in the book. A lengthy appendix contains the answers, furnished by experienced goat keepers, to twenty-four questions on the subject of goat keeping, addressed to them by the author. In reply to the query as to the best breeds of goat for milking purposes, the Toggenburg and the Anglo-Nubian are mentioned in practically all cases. Most goat keepers state their opinion that a yield of about 2 quarts of milk per day should be expected from a nanny with her second kid, and this amount should be kept up for several months.

The book is abundantly illustrated with photographs of representative animals of the various breeds.

THE FERMENTATION OF CACAO.

Considerable difference of opinion still exists as to the process involved in the fermentation of cacao, as well as the purpose and necessity of the operation. It is now generally believed, however, that yeast cells play an important part in bringing about the fermentation. Most probably, too, bacteria and enzymes also assist in the process. This subject is discussed in detail in the course of a lengthy article that appears in the *Annual Report* (1907) of the Porto Rico Agricultural Experiment Station. The following summary embodies the conclusions arrived at by the author (Mr. Oscar Loew, Physiologist at the Station) on the subject:—

The fermentation process itself is due in the first place to the presence and action of yeast cells, which multiply rapidly in the saccharine juice oozing from the pulped cacao, and produce alcohol and carbon dioxide. Bacteria, which develop rapidly after a certain time, also participate, and by their action, the alcohol formed by the yeast is converted by oxidation either wholly or partially, into acetic acid. These processes cause a rise of temperature and the death of the cells of seed and slime tissue, whereupon the juice of the slime tissue, more or less altered, collects at the bottom of the receptacles, together with the acetic acid produced.

The chief object of the fermentation is to shrink the slime tissue or pulp attached to the testa of the seed, allowing the remnants either to be washed away as is done in Ceylon, or dried upon the seed, forming an irregular brown film upon the testa. As the result of diminishing the amount of slime tissue present, the drying of the seed is much facilitated. The loosening of the adhesion between the seed and the testa, and the hardening of the testa are claimed as further effects of fermentation.

The fermentation has also an indirect influence on changes going on within the seed, inasmuch as by the temperatures produced (104° F. to 122° F.) the cells of the seeds are killed, thus liberating the oxidizing enzymes, which cause the formation of the brown colour, by oxidation of the tannin of the seed. This brown colouration is increased during the drying process, and finally by the roasting.

The taste of the raw cacao bean is not only altered by the partial oxidation of tannin during the fermentation or sun-drying of the seed, but also by products of roasting. The action of oxidizing enzymes, as well as the final roasting process, play a part in the development of the aroma.

COWPEAS.

The cultivation of cowpeas in the Southern States of America has largely increased of late years, and since the value of the crop, not only for the production of forage and pasturage, but also as a means of soil improvement, is becoming more and more recognized, there will, no doubt, be further extensions in the area devoted to the crop. The price of cowpea seed, however, has of late advanced very considerably, and until the supply of seed becomes more plentiful, growers are somewhat handicapped.

Farmers' Bulletin 318, lately issued by the United States Department of Agriculture, deals with the whole question of cowpea culture, the best varieties, and the different methods of utilizing the produce. The crop is described as the legume which has proved of the most value for use in rotation with cotton and sugar in the Southern States, and as one which can be depended on to succeed on practically all types of soil. Its growth, too, provides an excellent means of increasing the production of live stock, which is very essential in securing the maximum returns in any system of agriculture.

In some parts of the States cowpeas are often reaped and made into hay, which is fully as valuable as red clover hay. More frequently, however, the produce is used for forage or fed as pasturage, and it is for these purposes, as well as for the enrichment of the soil, that the crop can be recommended for more extensive cultivation in the West Indies.

If it is intended to utilize the crop as fodder, the cowpeas may either be grown alone, or as a mixture with sorghum or maize, etc. The latter serve to support the cowpea vines, and as the result of their inclusion, there is an increased yield of produce. The amount of seed required per acre is 1 bushel of cowpeas, mixed with from ½ to 1 bushel of maize or sorghum seed. When cowpeas are grown alone, about 2 bushels of seed per acre are required.

A cowpea crop is sometimes used for pasturage purposes, although this method of utilization is not the most economical. The best time to begin pasturing is when the first pods are ripe. In a feeding trial at the Alabama Agricultural Experiment Station, it was found that pigs fed on corn alone gained 0·36 ℔. daily, while pigs on cowpea pasture and corn gained 0·97 ℔. daily, at the same time consuming 36 per cent. less corn for each pound of gain.

Particulars are given in the pamphlet of feeding trials with this crop carried out at several Agricultural Stations in the States, and although in all the cases mentioned the produce was fed as hay, and not as green forage, the results bear ample evidence to the high feeding value of the cowpea vines. If a fair amount of peas is present the nutritive value is of course considerably increased. Under these circumstances it is stated that cowpea hay, fed alone, forms a satisfactory ration for working stock, as well as for cattle, sheep, and even hogs. Planters in the sugar-cane districts of Louisiana claim that horses and mules stand hot weather better when fed on cowpea hay than when fed on grass hay and corn. When compared with an equal weight of wheat bran as a constituent in the ration of mules, cowpea hay proved a superior food, as well as being cheaper in cost.

As a result of the property, possessed by cowpeas in common with other leguminous crops, of being able to take up nitrogen from the air by means of the bacteria which live in the nodules on the roots, the growth of the crop forms an excellent means of soil enrichment. The physical condition of the soil is also largely improved as a result of the addition of the large amount of humus formed by the decay of the roots. Although it is only in special cases that it is advisable to utilize cowpeas as green manure, yet on very poor, sandy land, or on stiff, heavy clay soils in bad mechanical condition, a crop of cowpeas ploughed under will give markedly beneficial results. Cowpeas are largely grown in rotation with cotton in the Southern States, and also with the sugar-cane in Louisiana. In a system of cropping in general use among cotton planters, the land is, for three years in succession planted with cotton, the fourth year in corn and cowpeas, and then in cotton again for three years. The Alabama Agricultural Experiment Station reports an increase of yield in one case of 696 ℔. of seed-cotton to the acre, or 83 per cent., as the result of ploughing under a crop of cowpea vines on land which had been in cotton in the previous season.

Practically the same plan of rotation is reported as being followed in the sugar-cane districts of Louisiana. Three crops of cane are taken off the land, and the fourth year, it is planted to cowpeas, or to corn and cowpeas. The working stock are fed almost exclusively on pea-vine hay or are grazed on cowpeas in the field.

There are a large number of different varieties of cowpeas grown, but only a few of these are extensively cultivated. For forage purposes the most desirable varieties are those which have a fairly upright habit, grow to a large size, hold their leaves well, and produce an abundance of pods. The most valuable kinds are the Whippoorwill (also known as Running Speckled, Bunch Speckled or Shinney), the Unknown or Wonderful, the New Era, and the Iron. The crop is one which takes a period of two months or slightly more, to reach maturity. For forage purposes, the produce would be available in rather less time.

COFFEE GROWING IN HAWAII.

Now that Brazil is producing coffee on such an enormous scale, the cultivation of the crop in other countries is necessarily becoming less remunerative, and probably this fact accounts for the falling-off in the exports of coffee from Hawaii, mentioned in the following note taken from the report, for 1906-7, of the British Consul at Honolulu:—

The centre of the coffee-raising industry of the territory is situated on the island of Hawaii, though the crop is also grown on Maui and Oahu. The total output of the islands has been estimated at about 3,000,000 ℔., of which four-fifths come from the districts of Kona on the southern side of Hawaii. Coffee is grown in the Kona district at elevations ranging from 1,000 to 3,000 feet, the temperature averaging from 55° F. to 90° F. After two years' growth of the plants a crop of from 5 to 12 bags per acre of cleaned coffee can usually be obtained. After three years' growth, at the end of which time the trees are fully matured, the yield is from 8 to 20 bags. Coffee ripens in Hawaii between the months of September and January, and there are two principal pickings. After the processes of pulping and milling, the higher grades are picked over by hand, and all discoloured and defective beans removed. The coffee is then packed in 100-℔. bags, and is ready for shipment. The export of the product has shown a steady falling-off during the past few years. For the fiscal year ending June 30, 1907, the value of the coffee exports from Hawaii was £28,940, which is, however, little more than half the value of the exports of the preceding year.

RATS AND THEIR DESTRUCTION.

In all parts of the world the rat is regarded by agriculturists as one of the most destructive pests attacking their crops. The part played by the rat in disseminating various diseases, notably bubonic plague, which is spread through the agency of fleas from the body of the rat, is now well known, and furnishes a further reason why no measure that may assist towards the ultimate extermination of the pest should be neglected.

In view of the attention now being given to the question of rat destruction in these colonies, as a result of the appearance of bubonic plague at Venezuela and Trinidad, the following extracts from a pamphlet (*Farmers' Bulletin 297*) issued by the United States Department of Agriculture, are worthy of note. Other extracts from the pamphlet will be given in the next number of the *Agricultural News*:—

Introduced into America about the year 1775 the brown rat [this is also the species that exists in the West Indies] has supplanted and nearly exterminated its less robust relative, the black rat, and despite the incessant warfare of man has extended its range and steadily increased in numbers. Its dominance is due to its great fecundity and its ability to adapt itself to all sorts of conditions. It breeds three or four times a year and produces from six to twelve, and even more young at a litter. Young females breed when only four or five months old. The species is practically omnivorous, feeding upon all kinds of animal and vegetable matter. It makes its home in the open field, the hedge row, and the river bank, as well as in stone walls, piers, and all kinds of buildings. It destroys grains when newly planted, while growing, and in the shock, stack, mow, crib granary, mill elevator, or ship's hold, and also in the bin and feed trough. It invades store and warehouse and destroys fur, laces, silks, carpets, leather goods, and groceries. It attacks fruits, vegetables, and meats in the markets, and destroys by pollution ten times as much as it actually eats. It carries disease germs from house to house, and bubonic plague from city to city; it destroys the farmers' pigs, eggs, and young poultry, and damages foundations, floors, doors, and furnishings of dwellings.

Poisoning is the method most generally adopted for the destruction of rats, and one of the cheapest and most effective poisons is barium carbonate, or barytes. This mineral has the advantage of being without taste or smell; and, in the small quantities used for poisoning rats and mice, is harmless to larger animals. Its action on rodents is slow, but reasonably sure, and it has the further advantage that the animals before dying, if exit be possible, usually leave the premises in search of water. Its employment in houses, therefore, is rarely followed by the annoying odour which attends the use of the more virulent poisons.

The poison may be given in the form of a dough made of one-fifth barytes and four-fifths meal, but a more convenient bait is ordinary oatmeal, with about one-eighth of its bulk of barytes, mixed with water into a stiff dough, or the barytes may be spread upon bread and butter or moistened toast. If a single application of the poison fails to drive all rats from the premises, it should be repeated with a change of bait.

Strychnine is a more virulent poison, but its action is so rapid that the animals often die upon the premises, a circumstance which prohibits its use in occupied dwellings. Elsewhere strychnine may be employed with great success. Dry strychnine crystals may be inserted in small pieces of raw meat, Vienna sausage, or toasted cheese, and these placed in the rat runs; or oatmeal may be wetted with a strychnine syrup, and small quantities laid out in the same way.

Strychnine syrup is prepared as follows:—Dissolve ½ oz. of strychnia sulphate in a pint of boiling water; add a pint of thick sugar syrup, and stir thoroughly. A smaller quantity of the poison may be prepared with a proportional quantity of water. In preparing the bait it is necessary that all the oatmeal should be moistened with syrup. Wheat is the most convenient alternative bait. It should be soaked over night in the strychnine syrup.

The two poisons most commonly used for rats and mice are arsenic and phosphorus, nearly all commercial preparations containing one or the other as a basis. While experiments prove that rats have great powers of resistance to arsenic, it may sometimes be used advantageously as an alternative poison. Preparations of phosphorus sold by druggists are often too weak to be effective; and home made mixtures, when of sufficient strength, are dangerous, as rats may carry the baits into walls or crannies and thus cause fires. For these and other reasons the Biological Survey does not recommend preparations containing phosphorus.

For poisoning rats in buildings and yards occupied by poultry, the following method is recommended: Two wooden boxes should be used, one considerably larger than the other, and each having two or more holes in the sides, large enough to admit rats. The poisoned bait should be placed on the bottom and near the middle of the larger box, and the smaller box should then be inverted over it. Rats thus have free access to the bait, but fowls are excluded.

RUBBER IN JAVA.

The particulars given in the latest report of the British Consul at Java indicate that a good deal of attention is being given to rubber planting in the island, and that a considerable amount of British capital is invested in the industry. The accompanying extracts are taken from the report:—

Considerable interest continues to be evinced in the cultivation of rubber-producing trees throughout the Dutch East Indies, and the suitability of the climate and soil, coupled with undoubted labour advantages which Java possesses over most other tropical countries, has resulted in a steadily increasing trend of European capital towards rubber enterprises in this country.

According to statistics lately compiled, the capital of British companies interested in rubber in the Dutch East Indies, but domiciled in the United Kingdom, amounted to nearly £1,500,000. This, however, does not include the numerous companies formed during the last few years, also with British capital, but domiciled in Java, which may be estimated at another £250,000.

The first congress of rubber planters was held in October last, at which it was resolved to institute an Experimental Station with nurseries, which should prove of valuable assistance to rubber planters. The area at present under cultivation is estimated at some 58,000 acres in Java, 25,000 acres in Sumatra, and 7,000 acres in Borneo, of which most of the older rubber and nearly all that is in bearing (say one-half of the whole acreage) must be *Ficus elastica*, as the cultivation of the Para variety dates only from 1905 onwards.

At present, therefore, exports are still inconsiderable, but in the course of a few years the Dutch East Indies should prove an important factor in the rubber markets of Europe.

MARKET REPORTS.

London,—June 9, 1908, 'THE WEST INDIA COMMITTEE CIRCULAR; Messrs. E. A. DE PASS & Co., May 29, 1908: Messrs. KEARTON, PIPER & Co., May 26, 1908.

ARROWROOT—2*d.* to 2¼*d.*
BALATA—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8 per ℔.
BEES'-WAX—Good quality, £7 17*s.* 6*d.* per cwt.
CACAO—Trinidad, 68/- to 69/- per cwt.; Grenada, 60/- to 65/- per cwt.
COFFEE—Santos, 29*s.*; Jamaica, 37/- to 57/- per cwt.
COPRA—West Indian, £16 10*s.* per ton.
COTTON—St. Vincent, 15*d.* to 16*d.*; Barbados, 14*d.* to 15*d.*; St. Kitt's, 14*d.* to 15*d.*; Montserrat, 14*d.* to 15*d.* per lb.
FRUIT—
- **BANANAS**—Jamaica, 4/6 to 6/- per bunch.
- **LIMES**—4/6 to 5/- per box of 200.
- **PINE-APPLES**—St. Michael, 2/3 to 4/6 each.
- **GRAPE FRUIT**—14/- to 16/- per box.
- **ORANGES**—Jamaica, 6/- to 7/- per box.

FUSTIC—£3 10*s.* to £4 10*s.* per ton.
GINGER—51/- to 80/
HONEY—20*s.* to 32*s.* 6*d.* per cwt.
ISINGLASS—West India lump, 1/9 to 1/11 per lb.; cake, no quotations.
LIME JUICE—Raw, 1/1 to 1/4 per gallon; concentrated, £12 10*s.* per cask of 108 gallons; Distilled oil, 2/- per ℔.; hand-pressed, 4/3 to 4/6 per ℔.
LOGWOOD—£3 10*s.* to £4 5*s.* per ton; roots, £2 10*s.* to £3 10*s.* per ton.
MACE—1*s.* 1*d.* to 1*s.* 2*d.* per ℔.
NUTMEGS—66's to 68's, 8*d.* to 8½*d.*; 76's, 6*d.*; 91's, 5*d.*; 105's to 118's, 4¼*d.*; 121's, 3½*d.*; 149's, 3¾*d.*
PIMENTO—Quiet; 2⅛*d.* to 2¼*d.*
RUM—Jamaica, 3/- to 3/3; Demerara, 1/6 to 1/7½ per gallon; Trinidad, no quotations.
SUGAR—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 16*s.* 2½*d.*; Molasses, 14/- to 14/6.

New York,—June 12, 1908.—Messrs. GILLESPIE, BROS. & Co.

CACAO—Caracas, 13c. to 15c.; Grenada, 12¾c. to 14c.; Trinidad, 12¼c. to 14¼c.: Jamaica, 11½c. to 13½c. per lb.
COCOA-NUTS—Jamaica, select, $20·00 to $22·00; culls, $14·00 to $15·00; Trinidad, $20·00; culls, $14·00 per M.
COFFEE—Jamaica, good washed, 9c. to 11c.; good ordinary, 7¾c. to 8¼c.
GINGER—12½c. to 17c. per lb.
GOAT SKINS—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 44c. to 47c., dry flint, per lb.
GRAPE FRUIT—Jamaicas, $3·00 to $4·50 per box and $5·00 to $8·00 per barrel.
LIMES—Dominica, $7·50 per barrel.
MACE—19c. to 31c. per ℔.
NUTMEGS—110's, 8¾c. per ℔.
ORANGES—Jamaica, $1·70 to $3·00 per barrel.
PIMENTO—4¼c. to 4½c. per lb.
SUGAR—Centrifugals, 96°, 4·40c.; Muscovados, 89°, 3·90c.; Molasses, 89°, 3·65c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. JAMES A. LYNCH & Co., June 16, 1908; Messrs. T. S. GARRAWAY & Co., June 23, 1908

ARROWROOT—St. Vincent, $4·00 to $4·10 per 100 ℔.
CACAO—Dominica, $14·00 to $15·00 per 100 ℔.
COCOA-NUTS—$14·00 per M. for husked nuts.
COFFEE—Jamaica, $9·50 to $8·50 per 100 ℔.
HAY—$1·65 per 100 ℔.
MANURES—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
MOLASSES—Choice, 19c.; Fancy, 21c. per gallon.
ONIONS—Bermuda loose, $1·21 to $1·50 per 100 ℔.
POTATOS, ENGLISH—$2·00 to $2·75 per 160 ℔.
PEAS—Split, $6·40; Canada, $3·10 to $3·20 per bag.
RICE—Demerara, $5·70 (180 ℔.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 ℔.
SUGAR—Muscovado, 89°, $2·05 per 100 ℔., package included; Dark crystals, $2·50; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—June 13, 1908, Messrs. WIETING & RICHTER; June 13, 1908; Messrs. Sandbach, Packer & Co.

ARROWROOT—St. Vincent, $9·50 to $10·00 per barrel.
BALATA—Venezuela block, 32c.; Demerara sheet, 48c per ℔.
CACAO—Native, 16c. to 18c. per ℔.
CASSAVA—80c.
CASSAVA STARCH—$9·00 per barrel of 196 ℔.
COCOA-NUTS—$12·00 to $16·00 per M.
COFFEE—Creole, 12c. to 13c.; Jamaica, 12c. per ℔.
DHAL—$5·75 to $6·00 per bag of 168 ℔.
EDDOS—$1·28 per barrel.
MOLASSES—Yellow, 19c.; Dark, no quotations.
ONIONS—Madeira, 3c.; Lisbon, 2½c. to 3c.; Dutch, 3c. per ℔.
PLANTAINS—20c. to 60c. per bunch.
POTATOS,—English, $2·80 to $3·00 per barrel.
POTATOS, SWEET—Barbados, $1·44 per bag.
RICE—Ballam, $6·30 to $6·40; Creole, $5·75 for good; Seeta, $6·00 per bag.
SPLIT PEAS—$6·00 to $6·10 per bag (210 ℔.); Lisbon, $4·50.
TANNIAS—$1·92 per bag.
YAMS—White, $2·16; Buck, $2·88 per bag.
SUGAR—Dark crystals, $2·80 to $3·00; Yellow, $3·50; White, $3·70 to $3·80; Molasses, $2·00 to $2·10 per 100 lb. (retail).
TIMBER—Greenheart, 32c. to 55c. per cubic foot.
WALLABA SHINGLES—$3·50 to $5·75 per M.
——**CORDWOOD**—$2·40 to $2·64 per ton.

Trinidad,—June 13, 1908.—Messrs. GORDON, GRANT & Co.

CACAO—$13·25 to $14·25 per fanega.
COCOA-NUTS—$22·60 per M., f.o.b.
COCOA-NUT OIL—60c. per Imperial gallon, cask included.
COFFEE—Venezuelan, 9c. to 9¼c. per lb.
COPRA—$2·50 to $2·75 per 100 ℔.
DHAL—$5·00 to $5·15 per 2-bushel bag.
ONIONS—$1·75 to $1·90 per 100 lb. (retail).
POTATOS, ENGLISH—$1·40 to $1·50 per 100 lb.
RICE—Yellow, $5·40 to $5·60; White, $5·25 to $6·00 per bag.
SPLIT PEAS—$5·85 to $6·00 per bag.
SUGAR—American crushed, $5·00 to $5·10 per 100 ℔.

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Courses of Reading and Examination in Practical Agriculture.

AT the West Indian Agricultural Conference held at Barbados in January of the present year a suggestion was brought forward by Dr. Francis Watts, C.M.G., that something might be done, through the Imperial Department of Agriculture, to establish a recognized standard of proficiency among overseers and managers of estates, by the institution of courses of reading on practical and theoretical agriculture, which should afterwards be followed by examination for certificates of proficiency (see *Agricultural News*, Vol. VII, p. 34). It was pointed out that such courses, which should deal with general agricultural principles, and also have special reference to the cultivation of local crops, should be the means of assisting overseers and others to take a more intelligent interest in their work.

Further, the establishment of means for improved education and more extensive knowledge on matters relating to their work for those engaged in practical agricultural operations should form an important means of assisting the agricultural industries of these islands, the management of which will, in course of time, rest so largely in the hands of men of the class indicated. It should also materially improve the prospects of these men.

The proposals made by Dr. Watts were received with a great deal of interest by the representatives attending the Agricultural Conference. Since then they have been unanimously approved by the Agricultural Societies of Barbados, Antigua, and St. Kitt's.

A scheme of reading courses in practical and scientific agriculture, together with a syllabus of examinations for certificates of competency has therefore been prepared, full particulars of which are given in a leaflet that has just been issued by the Imperial Department of Agriculture for distribution throughout these colonies.

It is proposed that there shall be three examinations, Preliminary, Intermediate, and Final respectively, and that, in every case, the examination shall be partly written and partly oral. In order to ensure that these tests shall be thoroughly practical in their nature, the oral portion of the examination will, it is hoped, in the case of Barbados at least, be conducted by experienced attorneys and managers, i.e., men who are thoroughly conversant with the practice of agriculture.

The Preliminary examination will deal with the elementary principles underlying agricultural practice, and will consist of questions on soils, their classification and physical properties, cultural operations, drainage, the elements of plant and animal physiology, etc. Candidates who have gone through the course provided in Agricultural Science at Harrison College, Barbados, and have obtained the Certificate of Proficiency, as well as those who have passed the Cambridge Senior examination in this subject, will be excused the Preliminary, and may proceed at once on leaving school to read for the Intermediate examination, which they will be allowed to take after one year's experience on estates. Except under unusual circumstances, the syllabus requires that other candidates shall have been engaged in practical agricultural pursuits for at least one year, previous to the Preliminary examination.

The first Preliminary examination will be held during 1909, and will be followed shortly afterwards, by the first Intermediate examination, open to those who have successfully passed, or have been excused, the Preliminary. Candidates will have a chance, therefore, of getting through both the Preliminary and the Intermediate examinations in one year.

The Intermediate examination deals more especially with the cultivation of the chief crops produced in the West Indies, i.e., sugar (with optional questions on rum), cotton, limes, cacao, bananas, rice, and provision crops. Candidates may select any two or more of the above crops, with the cultivation of which they are most familiar, and the questions set will deal with the preparation of the soil, manuring, planting, and after-cultivation of the crops, as well as the reaping or gathering, and the preparation of the produce for shipment. A knowledge of the insect pests and fungoid diseases affecting crops in the West Indies, and of the best methods of treatment will also be required from those presenting themselves for the Intermediate examination. All persons sitting for the Intermediate, including those who may have been excused the Preliminary, must have had practical experience for at least one year in the cultivation of the crops for proficiency in which they offer themselves for examination.

The Final examination will in the main, relate to the same subjects as the Preliminary and the Intermediate. A fuller and more extensive knowledge will, however, be required, and, in addition, candidates will be expected to be conversant with all questions affecting estate administration and management, such as estate book-keeping, the cost of performing various agricultural operations, the management of land, crops, and animals, as well as of the labourers employed on the estate.

The first Final examination will be held in 1910, a year after the first Intermediate. It is intended that these examinations be repeated yearly, so that while in 1909, Preliminary and Intermediate examinations only will be held, in 1910 and subsequent years, Preliminary, Intermediate, and Final examinations will be carried on.

As the result of these examinations, certificates signed by the examiners will be issued to successful candidates by the Imperial Commissioner of Agriculture. They will be divided into classes (first, second, and third) and will be endorsed with a statement of the subjects in which the candidates have shown themselves proficient. It is intended that the possession of a first class Final certificate shall be a guarantee that the holder is thoroughly capable of controlling an estate on which the crops are cultivated for which his certificate was granted.

No candidate will be allowed to obtain a certificate who has not thoroughly satisfied the examiners in both the oral and the written parts of the examination, and there is therefore a real necessity on the part of candidates to be thoroughly familiar with the details of ordinary estate work and routine, since it will not be possible to obtain a certificate merely on the basis of book-work.

In the leaflet referred to, full particulars are given of the books and other publications suitable for use in preparation for the examinations. These include a number of publications issued by the Imperial Department of Agriculture, which will be supplied to candidates free of charge. Other books recommended may, of course, be obtained through local booksellers.

SUGAR INDUSTRY.

Demerara Seedlings in Louisiana.

The Demerara sugar-cane seedlings D.74 and D.95 have been grown by many Louisiana planters for some years past, and that they are giving favourable results is evident from the fact that the area devoted to their cultivation promises steadily to increase.

The question of the value of these seedlings to planters in Louisiana is discussed in a short article in the *Sugar Planters' Journal* of May 23 last. The weather conditions in the State during the earlier part of last season did not suit these canes, and D.74 gave too spindly a growth, while D.95 promised good results only on the very best soils. For a time, therefore, it is stated, there was a prejudice against these seedlings, and some planters curtailed the area devoted to them in the plantings of last autumn. At the reapings, however, which took place mainly in December, the Demerara canes yielded surprisingly well, the tonnage per acre being equal to that of the native varieties, while the harvesting process was easier, and the return of sucrose higher in the case of the seedlings.

The superior sugar content of the seedlings, it is stated, is becoming more generally recognized in Louisiana, and on this account some factory owners are willing to pay for them a price 5 per cent. higher than that offered for native canes. It appears, however, that D.74 and D.95 grow more slowly, and mature later than the standard varieties of cane usually grown in Louisiana, but in view of the satisfactory ultimate yields given by the former, this is a small disadvantage.

Conditions and Cost of Sugar Production in Mexico.

The cultivation of the sugar-cane is on the increase in Mexico, and a good deal of foreign capital, largely from the United States, is invested in the industry. The output of cane sugar in the republic, for the year 1907, was 115,000 tons. Particulars relating to the Mexican sugar industry have been published in past numbers of the *Agricultural News* (Vol. VI, p. 259, and Vol. VII, p. 99). The following additional details as to price of land suitable for cane cultivation, cost of preparation, production of sugar, etc., are taken from the latest published report of the U.S. Consul at Mexico City, who states that they are furnished in response to numerous enquiries for information on the subject:—

Lands in a virgin state, suitable for the growing of sugar-cane, and situated in the tropical portions of the country—that is, in the States of Veracruz, Chiapas, and Tobasco range in price from $1 to $3 per acre. In the Tampico section of the State of Tamaulipas, one finds such lands higher in price, the influx of Americans having had the effect of increasing the value of the property.

Regarding the cost of clearing, cleaning, and planting lands suitable for cane cultivation, from $27·38 to $32·37 per acre is a fair estimate. This includes the clearing and burning of timber and planting of cane, also the cultivation of the cane for the first crop. This cost refers to lands which may be located in the States of Veracruz, Chiapas, Tobasco, and Campeche—that is, the hot lands, where vegetation is exceptionally rank. After the first crop is obtained the expense is, of course, reduced accordingly.

If modern machinery is employed, and the plant worked under the supervision of an experienced and competent manager, with cane yielding a density of 9° to 10½° Beaumé, from 200 ℔. to 210 ℔. of white sugar are obtained from 1 ton of cane.

The cost of producing white sugar in Mexico after the land has been prepared, i.e., planting cane, cultivation, cutting, conveying to mill, crushing, and boiling juice, paying all salaries, taxes, interest on capital, etc.,—in fact, including every expense on the plantation—is from $30·88 to $44·82 per ton of sugar, according to the wages for labour. These range from 25c. to 38c. per day; in some instances, perhaps a little less.

Under present conditions it is said that cane can be delivered at the mill for about $2 per ton; produced under general administration or by contract, about $3 per ton.

The Pessou Cane Harvester.

At a meeting, held in May last, of the Louisiana Sugar Planters' Association, the merits of a new cane-cutting machine, known as the Pessou cane harvester, came up for discussion.

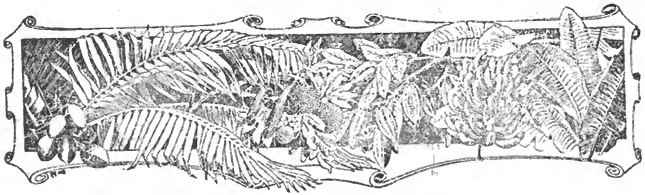
During the last reaping season, it is stated, this harvester underwent several practical estate trials, with satisfactory results. The cane reaped by the machine in the chief of these trials was the Demerara seedling D. 74, of which 4 acres were cut, and laid out in rows, in four and a half hours. Four mules were used to draw the machine, and three men were employed in the work. This represents a reaping power of from 120 to 200 tons of cane per day of ten hours.

The machine is built entirely of iron and steel. It is mounted on four wheels, two of which run on either side of the row of canes to be cut. The revolving knives may be raised or lowered to any level required, and one of the chief advantages urged in favour of the harvester is that by its means the canes may be cut much lower than by hand labour. This, of course, results in a superior return being obtained. It is claimed that the experiments so far carried out have demonstrated that the weight of cane cut per acre by the machine is 2 tons greater than that reaped by hand labour, while the yield of sucrose obtained represents a gain of 453 ℔. per acre, as compared with the return given under ordinary cane-cutting methods. This is equivalent to an additional 5 per cent. in the average crop yield. Figures relating to estate work done last season by the harvester are given in support of the above claim.

It was remarked, in relation to the experiments carried out, that the use of the machine had no bad effect on the stools of cane, and the resulting ratoons show no signs of damage whatever. Alternate rows were cut by the machine and hand labour respectively, and there is little difference to be observed in the condition of the ratoon crop following, and now under cultivation.

One of the speakers who had had experience with the Pessou harvester expressed his conviction that the machine was of practical design and construction, and that in the hands of an intelligent man, it could be worked with great benefit and saving to planters.

Probably the harvester will require certain modifications before it is thoroughly adapted to practical estate use, but if developed, and put on the market at a reasonable price, such a machine would, of course, result in an enormous saving of labour on large estates. This should especially recommend it to the consideration of planters in British Guiana.



WEST INDIAN FRUIT.

GRAPE-FRUIT CULTIVATION.

The cultivation of the grape-fruit, with fuller details as to the most valuable varieties, forms the subject of an article in the May number of the *Cuba Review*. The question is naturally discussed from the point of view of the Cuban grower, but some of the points mentioned are worthy of note by growers in the British West Indies.

Owing to the prolificacy and long life of the trees, as well as the excellent keeping qualities of the fruit, growers should get a better return from grape-fruit than from oranges, and tree for tree a grape-fruit plantation should yield more boxes of fruit than an orange plantation.

Grape-fruit trees are more vigorous growers than orange trees, and they require an abundant supply of plant food in order to give the best returns. Artificial fertilizers can profitably be applied on a larger scale than in the case of other citrus fruits. It is recommended that grape-fruit trees be planted about 30 feet apart, or forty-eight trees per acre. Sour orange and rough lemon stocks are to be preferred for grafting purposes, the former for moist, well-drained lands, and the latter for drier localities. Plantings should not be confined to a single variety. Two kinds at least should be planted, and if the time of fruiting of one kind is a little later than the other, the period during which a return may be obtained is extended.

While the orange crop must be marketed early, the grape-fruit will hang on the tree for months, if needful, and the quality of the fruit, in the case of most varieties, improves with time. Since the bulk of the Florida crop is placed on the American market in November, December, and January, Cuban growers are advised to grow late-maturing varieties, which will be available in February, March, and April, when they will have the monopoly of the market.

The number of varieties recommended is not great, Duncan and Marsh Seedling being the chief. The Duncan tree is a low-spreading, vigorous grower, very prolific, and a regular bearer. It bears large-sized fruit, which matures late, and has an excellent flavour. Marsh Seedling resembles the Duncan in its habit of growth. It also is a good bearer, the fruit being of excellent quality and ripening late.

Other varieties mentioned are Triumph, Walters, and Hall's Silver Cluster. The first-named is a vigorous, upright grower and produces very heavy crops which mature early. The fruit, however, is liable to deteriorate if left on the tree too long. Owing to the large number of fruits produced, too, the crop should be thinned, so as to allow the remaining portion to develop to full size.

Growers are advised to cultivate only the larger-fruited varieties since the fruit finds a more ready and remunerative market, and also entails less expense in picking, packing and marketing. Only the thin-skinned, smooth, bright, juicy fruit should be exported.

LIME CULTIVATION IN BRITISH GUIANA.

Efforts have for some time been in progress to extend the cultivation of limes in British Guiana, and the possibilities of the industry are beginning to be generally recognized in the colony. It is stated, however, in the *Demerara Argosy*, that more planting would be done if seedlings could be provided by the Department of Science and Agriculture at a somewhat lower price than that which is at present charged, viz. $1·50 per 100.

It is pointed out that in Dominica lime plants are obtainable at 1s. per 100, and at this price the seedlings are within the reach of practically everyone. No doubt when sufficient time has elapsed for a more plentiful supply of seedlings to become available in British Guiana the price will be proportionately reduced, and, as was the case in Dominica, the Government will probably find it worth while to supply plants at a cheap rate in order to encourage planting. Planters, too, may find it worth while to start small nurseries of their own, and raise seedlings.

The chief planting in British Guiana has been done by the Demerara Development Company, which has a plantation of about 32,000 seedling limes at Agatash, near Bartica. The company, too, is prepared to purchase limes from other growers at 60c. per barrel. It has, at present, a temporary factory at Aarora, but the ultimate intention is to erect a permanent factory in the vicinity of La Penitence, with branch factories in suitable districts elsewhere.

Meetings have of late been held at various centres of British Guiana to interest the people in lime cultivation. One of these took place at Anna Regina, and an address on the methods of lime culture, and the prospects of the industry, was delivered by Mr. Robert Ward, Agricultural Assistant under the Department of Science and Agriculture. Those attending the meeting passed a resolution at the close in which they expressed their intention to start the planting of limes.

GRAFTED CACAO AT DOMINICA.

Cacao growers will be interested in the illustration (Fig. 4) which appears on this page, and which has been reproduced from a photograph of a grafted cacao tree growing at the Dominica Botanic Station.

The photograph was taken on March 25, 1908, when the tree was two years six and a half months old, having been planted on September 11, 1905. In a letter accompanying the photographs sent, Mr. Jones, the Curator of the Gardens, states that this cacao tree is 9 feet high, and measures 9 feet through the spread of the branches at 3 feet from the ground.

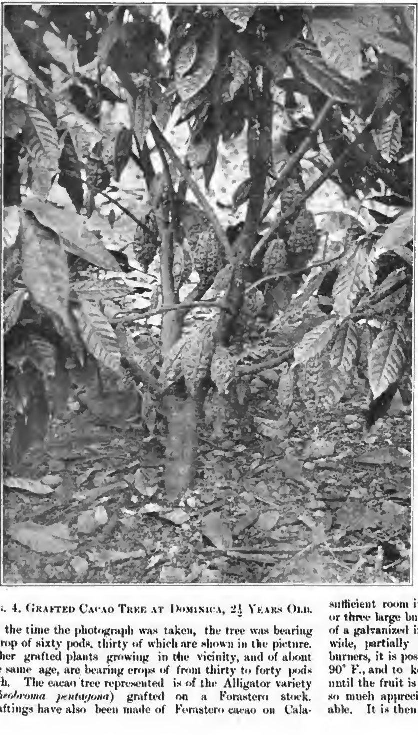


Fig. 4. Grafted Cacao Tree at Dominica, 2½ Years Old.

At the time the photograph was taken, the tree was bearing a crop of sixty pods, thirty of which are shown in the picture. Other grafted plants growing in the vicinity, and of about the same age, are bearing crops of from thirty to forty pods each. The cacao tree represented is of the Alligator variety (*Theobroma pentagona*) grafted on a Forastero stock. Graftings have also been made of Forastero cacao on Calabacillo stocks. Mr. Jones states that these young trees try to produce fruit before they are two years old, but at the Station it is the practice to cut off the young pods, since it is not advisable to allow them to fruit so early.

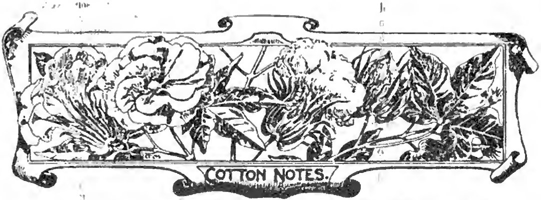
A picture of the above tree, at eighteen months old, appeared in the *Report*, for 1906-7, of the Dominica Botanic Station, so that persons possessing a copy of this report may, on comparison, gather some idea of the growth made by the tree since the earlier photograph was taken.

CURING OF LEMONS.

The curing of lemons formed the subject of an interesting article that appeared in a late number of the *Agricultural Journal* of the Cape of Good Hope. That this process greatly improves the condition of the fruit is evident from a comparison of a cured with an uncured lemon. The one has a nice fine skin, and is full of juice, while the other is hard and thick-skinned, and the juice is extracted only with difficulty.

The object in lemon curing is to reduce the thickness and increase the toughness of the peel, and at the same time to increase the relative proportion of juice in the fruit. As a result of the process, too, the keeping properties of the lemons are much increased, and, at times when prices are unsatisfactory, the fruit may be kept over until the market conditions show improvement.

Lemons that are to be cured should be picked just as they are beginning to turn ripe, and when about 2¼ inches in diameter. If allowed to hang until quite ripe they do not keep so well. Lemon growers in California regularly cure their produce before placing it on the market. After the fruit has been gathered, washed, and graded according to colour, it is allowed to stand for a few days, and then packed in paper-lined boxes. These boxes or cases are then stacked in blocks of four so as to allow a circulation of air around each case. A tightly-fitting tent-like covering of canvas is placed over the stacks, and this may be raised when necessary, to regulate the temperature, or to allow the escape of moisture. The lemons may be left under the covering until they are thin-skinned and pliable, but it is advisable to place them on the market before the skin shows any signs of hardening. In California the covering tent is usually so arranged as to have sufficient room in one corner for a kerosene stove with two or three large burners. By means of this stove and the use of a galvanized iron tank about 3 feet in length and 2 feet wide, partially filled with water, and placed above the burners, it is possible to raise the temperature of the tent to 90° F., and to keep it at this point for one or two weeks, or until the fruit is brought to that pale straw colour which is so much appreciated on the market and therefore so desirable. It is then graded, packed, and marketed.


COTTON NOTES.

WEST INDIAN COTTON ON THE LIVERPOOL MARKET.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, on June 22 last, in reference to the sales of West Indian Sea Island cotton :—

Since our last report holidays have rather interfered with the market.

About 170 bales West Indian Sea Islands have been sold at fairly steady prices. The sales include about 50 bales St. Croix, 20 Anguilla, and 30 St. Kitt's, at 14½*d.* to 15½*d.*, the remaining 70 bales being stains at 6½*d.* to 9½*d.*

Spinners are only likely to buy from hand to mouth until more is known about the American Sea Island growing crop.

SEA ISLAND COTTON MARKET.

In their report, dated June 13 last, Messrs. Henry W. Frost & Co., of Charleston, give the following particulars in reference to the condition of the Sea Island cotton market:—

There were no sales during the past week, and the condition of the market remains unchanged.

The unsold stock consists of 100 bales odd bags, of 'fine' to 'fully fine' quality, held at 30c., 100 bales Beauforts [cotton produced in the neighbourhood of Beaufort in North Carolina] of 'fully fine' quality, held at 30c., and the balance planters' crop lots, held at 32c., and upwards.

On June 20, Messrs. Frost write :—

The sales this week consisted of 10 bales of 'extra fine' quality, on account of a Northern mill ; otherwise the market remains quiet and unchanged.

The unsold stock remains the same as last week.

In regard to the coming crop, the weather has been favourable, and from all reports it appears that the crop is making good progress, and that the outlook just now is promising. It must not be overlooked, however, that the acreage in Georgia has been reduced very much.

EXPERIMENTS WITH COTTON IN ST. KITT'S.

Mr. F. R. Shepherd, Agricultural Superintendent of St. Kitt's-Nevis, has forwarded the following notes on various experiments carried out with Sea Island cotton in St. Kitt's during the season 1907-8 :—

In continuation of the work done in the previous three years, manurial and other experiments with cotton have been carried out at La Guerite during 1907-8.

The manurial experiments have been conducted on the same plots, and on similar lines, as in the three previous years, according to the scheme published in the *Agricultural News*, Vol. III, p. 237. As in previous years these trials go to prove that under the conditions existing at La Guerite, the action of artificial or other manures has not been remunerative, as the returns from the no-manure plot have been equal to those from the manured plots. The successful growing of cotton seems more dependent upon good cultivation and proper tilth than upon the application of manure.

The manurial experiments were carried out in triplicate, the cotton in the first set of experiments being planted in June ; in the second series, it was planted in August, and in the third series, in September. The influence of the time of planting upon the yield of seed-cotton obtained, is shown in the following table. For purposes of comparison the returns for the two previous years are also included :—

Experiments.	Date of Planting.	Seed-cotton per acre. lb. 1905-6.	Seed-cotton per acre. lb. 1906-7.	Seed-cotton per acre. lb. 1907-8.
Series 1.	June.	1,247	1,444	1,245
Series 2.	August.	1,333	1,205	1,377
Series 3.	September.	152	350	475

The conditions of soil cultivation, manuring, etc., were the same in each series, but the later-sown cotton has proved a failure in every case, and it is evident that the best return may be expected from cotton planted in June.

Experiments in planting cotton at different distances were also continued on ½-acre of land on which cotton has been planted for four seasons without any kind of manure or green dressing. The seed was planted at distances of 4 × 2 feet, 4 × 3 feet, and 4 × 4 feet respectively. The plot in which the plants were 4 × 2 feet apart yielded at the rate of 1,434 lb. of seed-cotton per acre; in the 4 × 3 feet plot, the yield of seed-cotton was at the rate of 1,380 lb., and the third plot (4 × 4 feet) gave a return equal to 1,218 lb. of seed-cotton per acre.

Experiments to compare the effect of planting on the cane bank with planting on the 'centres,' two plants at each 'centre,' showed that the returns were the same in each case, viz., at the rate of 1,000 lb. of seed-cotton per acre.

The total area under experiment at La Guerite was 6½ acres, and from this was shipped 1,883 lb. of lint. The first half of this has been sold at 1*s.* 6*d.* per lb., while the remaining portion is yet unsol

PEASANT HOLDINGS IN JAMAICA.

In their report on the Prize Holdings Competition for the present year among peasant cultivators in St. Mary's parish, Jamaica, the adjudicators state that they were much pleased with the efforts put forward to win the prizes by the majority of cultivators, and that really wonderful improvements had been effected on some holdings since the competition was started.

The report also mentions that the effects of the past drought are still very evident throughout St. Mary's parish, and crops are recovering but slowly. Cacao promises a good crop for the coming season, more especially from the younger trees.

The following paragraphs come at the end of the report:—

We observed great improvement since the last competition in the homes of peasantry, in forking, trenching and pruning cacao, and especially in timing the fruit for the spring market. There is, however, plenty of leeway to make up in cacao cultivation, and more especially in curing the produce.

A point that is noticeable throughout the parish is the great waste of vegetable matter which might be utilized in feeding live stock. People with 10 acres of land buy milk because 'they have nowhere to feed a cow.' A similar state of things exists in regard to pigs. We have no hesitation in saying that where there is one cow kept in St. Mary to-day, there might be fifty, and where there is one pig kept there might be a hundred.

PEASANT PROPRIETORS IN GRENADA.

A Commission was appointed in March 1907, by his Excellency the Governor of the Windward Islands, to investigate certain matters relating to the peasant proprietors of Grenada, more especially the arrangements and conditions made by them with the dealers for the sale of their cacao.

From the report of the Commission, lately published in the Grenada *Official Gazette*, it would scarcely appear that the peasantry of the island are in a flourishing condition, although this, to a great extent, seems to be due to bad management of the holdings on the part of the proprietors. It is reported that there has been a yearly diminution in the output of produce from the holdings, and the Commissioners give it as their opinion that if the soil had been moderately well tilled and nourished, there would not have been such a falling-off in the produce returns.

It was clearly established, too, that the peasant proprietors of the island do not cultivate the amount of ground provisions that was produced by their forefathers, and for this want of exertion on their part in their own interest, the Commission felt that the small holders were somewhat blameworthy.

This indicates that these peasant holders scarcely realize their responsibilities as landed proprietors, and that, without supervision, the condition of the land deteriorates under their management. The report mentions, too, that there is a strong tendency among the peasants, so soon as they acquire land, of however small an area, to depend solely for the support of themselves and their family, on the produce thereof.

The following are among the recommendations made by the Commission, with the object of bringing about some improvement in the condition of the peasant proprietary class:—

That more experimental plots be established, particularly in the districts of Concord, Grand Roy, and Mon Plaisir, and that the 'Prize Holdings' competitions be maintained, especially in these districts, for some years.

That depôts be established in suitable districts, where all cacao could be sold by public auction.

That some public notification of the local market rate of cacao be regularly exhibited in conspicuous places in the various districts.

That a Government Land Bank be established for the assistance of the peasants in the cultivation and improvement of their holdings.

BAY OIL.

The production of bay oil is on the decline in Dominica, and Messrs. Schimmel & Co., in their semi-annual report, dated April 1908, attribute this to the more remunerative nature of lime oil production. The following is taken from Messrs. Schimmel's report:—

The purchase of bay oil, which is carried out on our behalf by our New York branch, in Dominica, West Indies, is becoming more and more difficult, and for the last consignments of bay leaves, an advance of about 20 per cent. in the prices had to be agreed upon. The cause of this is probably owing, in chief, to the fact that recently more attention has been paid in Dominica to the production of lime oil, which is said to give much better results.

The steps taken by us to discover other districts in which bay oil is produced have been only partially successful, so that for the present the scarcity of the material is likely to continue. This scarcity has, during the past few months, resulted in an advance of the price.

INDUSTRIAL SCHOOL NEEDED FOR BRITISH HONDURAS.

The Belize *Colonial Guardian* draws attention to the large number of juvenile offenders committed to prison in British Honduras during 1907, chiefly for theft, and comments on the need of an Industrial School in the colony, where such youths could be kept under supervision for two or three years, and at the same time receive training in the cultivation of various agricultural crops.

In a colony whose future prospects depend almost entirely upon the production of agricultural produce, an Industrial School should necessarily be a school where agriculture is the chief subject taught, and such an institution should prove of the greatest value as a centre for the spread of improved cultural methods, and a starting ground for the cultivation of the new crops.

At present the great need of British Honduras appears to be the introduction of new and permanent cultivations such as cacao, nutmegs, rubber, etc., and the extension of the area under cocoa-nuts, sugar, vanilla, and other crops. Such development necessarily means the investment of capital and is unlikely to be brought about by peasant cultivators working alone.

An Experiment Farm worked in connexion with the suggested Industrial School, might go far to demonstrate that such crops as the above could be profitably raised in British Honduras; and if so, it would serve a useful purpose in attracting immigrants to the colony. The establishment of an Industrial School, and its maintenance during the early period of its existence, would necessarily be expensive, but at the end of a few years, it should become, to a large extent, self-supporting.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

Particulars are given in the editorial of the proposed scheme of reading courses and examinations on agricultural work which the Imperial Department of Agriculture hopes to institute for the benefit of overseers and sub-managers on West Indian estates.

Interesting notes on the conditions and cost of sugar production in Mexico, and on a new machine for reaping canes which was tried in Louisiana last season, appear on page 211.

Grape-fruit cultivation is extending in Cuba. The varieties most recommended are Duncan and Marsh Seedling (page 212).

Cacao growers will be interested in the brief article, with illustration, to be found on page 213, dealing with the remarkable yield of a young grafted cacao tree at Dominica.

Cotton Notes (page 214) include particulars of various experiments with Sea Island cotton conducted at St. Kitt's during the past season, as well as reports on market prices.

A report lately issued by the Mycologist to the Government of India indicates the existence of a root disease of cocoa-nut palms in Travancore, similar to that which is causing so much loss in Trinidad plantations (page 219). On page 221 will be found the first part of an article dealing with the diseases of cacao.

Sorghum Poisoning.

With reference to the remarks on the poisoning properties of sorghum at certain stages of its growth, which were quoted from a foreign journal in the *Agricultural News* of May 30 last (Vol. VII, p. 169), it may be mentioned that prussic acid does not occur in the free state in the growing plant, but is yielded by a glucoside present, when the latter compound is acted upon by an enzyme or ferment also occurring in certain parts of the plant. The amount of glucoside present, and therefore the possible amount of prussic acid that may be formed, diminishes as the plant approaches maturity.

Earlier experiments appeared to indicate that on drying the sorghum in the sun, the plant lost its possibly poisonous properties. Later experiments, however, carried out at Melbourne, and in the laboratory of the Government of India, have shown definitely that this is not the case, and that the glucoside present is unchanged by sun-drying.

Revival of Jamaica Fruit Trade.

The tables attached to the report, for the year 1907, of the British Vice-Consul at Charleston, South Carolina, show that there has been of late a marked revival of fruit importations from Jamaica and other British West Indian Islands. It is stated that during the year about fifty small cargos of Jamaica fruit were delivered at Charleston. The value of the bananas received in this way reached $347,489, of the cocoa-nuts $11,992, and of the oranges $5,523.

Five or six years ago a considerable fruit business was carried on between Jamaica and Charleston, but after the hurricane of August 1903, which destroyed so many trees in Jamaica, the trade fell away, and the steamers were withdrawn. Its re-establishment, therefore, should be a matter of gratification to the fruit growers of Jamaica.

Curing and Packing of Oranges.

Investigations carried out by officers of the U.S. Department of Agriculture as to the most suitable methods of transport of oranges from California to the Eastern States of America have been in progress for a considerable time, and the recently issued *Bulletin 123* of the Bureau of Plant Industry gives a full account of all the work done.

It is mentioned that in California, as in many other orange-exporting countries, it was the common practice to allow the oranges to stand for a time before packing, with the object of curing or wilting the skin. It was believed that if the fruit were packed in a fresh condition, wilting would occur in the box, and the contents would arrive at the journey's end in a loose, and possibly damaged condition. Comparative tests made to ascertain the effect of the preliminary curing showed, however, that except in the early part of the season, the fruit can be packed quite as successfully when the curing is omitted. The skin of the immature fruit is hard, and wilting undoubtedly facilitates the packing process. Later in the season when the fruit is ripe, curing had little influence, since at that stage the skin is naturally pliable.

Ploughing Match at Barbados.

A ploughing match and show of stock and sugar was held at Poole Plantation, St. John, Barbados, on June 24 last. Prizes were offered for ridge ploughing, flat ploughing, and for open and close subsoil ploughing, and there were also competitions among labourers for prizes for cane-hole digging and forking. A number of teams competed in the ridge and subsoil ploughing, and some good work was done. There was only one entry for flat ploughing, however, and no competition took place. In the cane-hole digging and forking classes there was a fair number of competitors, more especially in the latter, and the work was done quickly and efficiently. Both the cane-hole diggers and the forkers were allowed two hours to complete not less than sixty cane-holes, these holes to be 2 feet square and 6 inches deep.

There was a good show of estate animals present, the cattle and the mules being in excellent condition. An object of considerable interest to the visitors was a water buffalo from Society estate. Prizes were awarded also for unworked cattle, bulls, cows, horses, sheep, goats, and swine. The samples of sugar sent in were small in number, and there was no competition for syrup.

The majority of the planters in the neighbourhood attended the show, and a number also came from a distance. Lord Basil Blackwood, the Acting Governor of Barbados, was present, and in the afternoon distributed the prizes to the successful competitors.

Formic Acid and Rubber Latex Coagulation.

Acetic acid, either alone, or in combination with alcoholic cresote, is extensively employed in the East, as a coagulant of rubber latex, but the superior qualities of formic acid as a coagulating agent of Para rubber latex are urged by a writer in a late number of the *India-rubber Journal*. Formic acid is much stronger than acetic, and particulars are given of experiments which show that it is correspondingly more active in its coagulating action upon the latex. As a result the amount of formic acid that is needed to coagulate a given amount of rubber latex is less than half the amount of acetic acid that would be required. The use of the former is therefore evidently more economical.

Formic acid possesses antiseptic properties, and it is claimed that its use for coagulating purposes exercises a preservative influence upon the raw moist rubber prepared by its means. It would appear, indeed, that in this connexion, formic acid combines the properties of acetic acid and creosote, and could therefore be employed with especial advantage in the preparation of moist block rubber.

In the experiments referred to, it was found that for general purposes the use of larger volumes of the more dilute formic acid gave better results than were obtained when small quantities of the acid of greater strength were employed. The most rapid and complete coagulation, resulting in a product of standard quality, was obtained when to each 500 c.c. of latex were added 20 to 25 c.c. of a 5 per cent. solution of formic acid.

Guayule Rubber.

The Guayule shrub (*Parthenium argentatum*) is a rubber-yielding plant that is found widely spread in the drier part of Northern Mexico. A note on the properties of this plant was given in the *Agricultural News*, Vol. V, p. 413, while a lengthy article discussing its possible economic value appeared in the *Kew Bulletin*, 1907, No. 7. The Guayule plant is one of very slow growth, and contains little rubber until eight years old, whereas ten years may be considered as the time required for a plantation to become fit for profitable working.

Some time ago it was suggested that this rubber might possibly be of commercial value in some parts of Antigua, and through the courtesy of his Excellency the British Minister at Mexico City, the Imperial Commissioner of Agriculture has been enabled to obtain a supply of seeds of the plant. These seeds have been distributed to several of the Botanic Stations, so that it will be possible later to obtain some idea of its value for planting in the West Indies.

West Indian Bulletin.

A previous number of the *West Indian Bulletin* (Vol. VIII, No 4) contained an abstract of the proceedings of the Agricultural Conference held at Barbados in January last. In a number just issued (Vol. IX, No. 1), five of the principal papers read at the Conference are published in full, together with summaries of the discussions upon each. These all relate to the sugar industry.

The first paper—'Varieties of Sugar-cane and Manurial Experiments in British Guiana,' is by Professor Harrison, C.M.G., and gives an account of the progress of the experimental work with sugar-cane that has been carried on in British Guiana for several years past. Tables are included which show the extension that has taken place of late years in the area under cultivation with new varieties of sugar-cane. For the present season the area devoted to these new varieties reaches 32,061 acres. The results of Professor Harrison's investigations on the composition of soil waters from land under sugar-cane cultivation in British Guiana, and the conclusions arrived at, are of considerable interest.

The most striking and interesting points in the seedling cane and manurial experiments carried on at Barbados during the season 1906-7, are dealt with in a paper by Professor d'Albuquerque. Fuller details of this work are given in Pamphlet 49 of the series issued by the Imperial Department of Agriculture.

In a third paper, by Dr. Francis Watts, C.M.G., the latest results obtained in the sugar-cane experiments in the Leeward Islands are presented.

This number of the *Bulletin* also contains two further papers by Dr. Watts: 'The Central Sugar Factory at Antigua,' a summary of the contents of which appeared in the *Agricultural News* of March 21 last (Vol. VII, p. 81), and 'Observations on the Work of Sugar-cane Mills,' which was summarized in the editorial of the last issue of the *Agricultural News* (Vol. VII, p. 193).

INSECT NOTES.

Strength of Hardbacks.

In an article on Hardbacks (see *Agricultural News*, Vol. IV, p. 42), a series of experiments was described in which trials were made of the strength of individuals of this species (*Ligyrus tumulosus*). As a result of these trials, it was found that a hardback, harnessed with a piece of thread to a card, was able to draw a load weighing 15·43 times its own weight.

In a second test, a hardback placed under an inverted glass dish was able to push a load 141 times its own weight.

In a third trial, a hardback was able to move a load equal to 400 times its own weight. In this trial the insect was placed under a small metal box which was so shallow that it rested directly on the beetle, and the load was partly carried and partly dragged.

In a trial more recently made, it was found that the figures already published gave no adequate idea of the real strength of this small insect. A beetle weighing 0·352 grammes was placed under a glass paper weight which had a hollow on the under side. The thickness of the beetle's body was greater than the depth of the hollow in the glass, so that when one end of the paper weight rested heavily on the insect the other end rested on the table. As the insect showed its ability to move the paper-weight, additional weights were added until a load of 518·6 grammes was moved. This load was actually moved forward, not twisted about, so that the whole bulk must be considered to have been moved.

The proportion of weight of insect (0·352 grammes), to the weight of load, 518·6 grammes, is found to be 1 to about 1,473. In other words, the hardback moved a load 1,473 times its own weight. This is a record of remarkable strength. This great strength has probably been developed in these insects to meet the requirements of their habits of life. The hardback grub lives in the soil and after pupation in the earth the adult finds it necessary to force its way to the surface, and to accomplish this requires the exertion of a great amount of strength.

Revision of Names of Scale Insects.

An article on the popular names of insects appeared in the *Agricultural News* for April 8, 1905 (see Vol. IV, p. 106), in which it was pointed out that the common names vary in different localities, but the scientific or technical names were constant in all countries. It happens, however, from time to time that changes are necessary in the technical names of insects, but these changes should always be based on careful study and should be in accordance with certain fixed rules.

A short time ago a *Catalogue of the Coccidae of the World* was published by Mrs. Fernald of Amherst, Mass., in which many changes were made in the technical names of this extremely important group of insects. These changes in nomenclature have come about in support of the law of priority, which is that the first-published technical name given to any insect shall stand as the name of the species, provided the publication of the name is accompanied by a description sufficiently complete, so that other entomologists can identify insects of the species by means of the description.

It will readily be seen from this that revisions in the nomenclature of any groups of insects will be necessary from time to time in the natural order of events. The earliest published accounts of any species may be overlooked until some specialist makes a complete study of the literature of the group on which he may be working, and establishes the first published recognizable description. Again, it may happen that workers in different parts of the world may describe the same insect at nearly the same time, and that in this way more than one name may come to be known for the same species. In both these ways confusion is brought about, and it becomes necessary to have a day of reckoning and to do away with duplication of names.

It happens also that certain workers are given to breaking up groups of insects, and others to combining groups, and this also brings about other changes in names. In cases like these, however, it sometimes happens that alteration is made when it is not necessary, so that it is well to be cautious in adopting such changes. The names used in the Catalogue already mentioned have been very generally adopted, and as they are those that appear in nearly all entomological and agricultural papers to designate these insects, it is suggested that they be adopted for use in the West Indies, and a list is given herewith of a few of the best known of the scale insects in these islands, with the names under which they were formerly known, the revised names, and the common names.

Under this revised scheme the orange mussel scale (*Mytilaspis citricola*) is now known as *Lepidosaphes beckii*, the cotton shield scale (*Lecanium nigrum*) as *Saissetia nigra*, the mango shield scale (*Lecanium mangiferae*) as *Coccus mangiferae*, the common mealy bug (*Dactylopius citri*) as *Pseudococcus citri*, the cotton white scale (*Chionaspis minor*) as *Hemichionaspis minor*, and the black line scale (*Ischnaspis filiformis*) as *Ischnaspis longirostris*.

In future publications of the Imperial Department of Agriculture when any reference is made to insects whose technical names have lately been altered, the old name, printed in Roman type, will accompany the new, until the new has become so well known that it is no longer considered necessary. Thus the orange mussel scale (*Lepidosaphes beckii* [Mytilaspis citricola]) indicates that *Lepidosaphes beckii* has replaced *Mytilaspis citricola*.

Other examples are the common mealy bug (*Pseudococcus* [Dactylopius] *citri*) indicating that *Pseudococcus* has replaced *Dactylopius*, and the black line scale (*Ischnaspis longirostris* [filiformis]) indicating that *longirostris* has replaced *filiformis*.

An Order-in-Council recently made in Grenada, enacts that no animal arriving at the island from St. Vincent shall be allowed to land unless it is accompanied by a certificate from the Government Veterinary Surgeon of St. Vincent, testifying that the animal has been kept in quarantine for at least fourteen days immediately before shipment, and that it has undergone efficient vaccination during the previous twelve months. Further, the fodder provided for the animal on board must not have come from an area infected with anthrax.

DISEASES OF COCOA-NUTS IN TRAVANCORE.

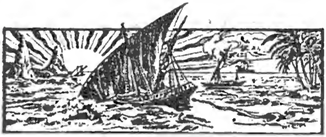
Considerable interest has, of late, been taken in the diseases of cocoa-nut palms. The Mycologist (Mr. F. A. Stockdale B.A., F.L.S) on the staff of this Department has carefully studied the fungus diseases prevalent in Trinidad and British Guiana.

His report on a visit to Trinidad, was given in abstract in the *Agricultural News*, Vol. VI, p. 75, and attention was called to (1) root disease, (2) leaf disease, and (3) bud rot. The root disease was found to be the most serious and was causing considerable loss in some districts.

The following extracts taken from a report by Dr. E. J. Butler, Imperial Mycologist for the Government of India, in which he describes a root disease of cocoa-nut palms in Travancore caused by a fungus similar to that found by Mr. Stockdale to be associated with the root disease in Trinidad, are full of interest:—

> As a general rule the first indication that a cocoa-nut palm is attacked is the opening out of the outer leaves from the head. The leaf stalk becomes slightly flaccid and the weight of the leaf causes the whole to droop. Then the ends of the pinnae or leaflets at the extremity of the leaf become flaccid and hang down almost vertically. This is accompanied by a loss of colour; the drooping and discoloration of the leaflets then extend gradually backwards to the whole leaf. Later on, the tips of the leaflets turn yellow and dry up, followed gradually by the entire leaf, which eventually hangs down withered from the crown. One after another, or many together, all the leaves are similarly affected. Intermediate conditions are common; young trees often have a large proportion of leaves healthy with only a few yellowed, others have all the leaves equally discoloured and drooping at the tips of the leaflets, before any dry up.
>
> After the leaves, the most extensive alterations are found in the roots of diseased palms.
>
> Each main root of a palm gives off numbers of white lateral roots, which again give off others. Except in advanced cases of disease, the main roots of a diseased tree will be found for the most part unaltered. A large proportion of the lateral roots are however rotted, and, in some cases, this rot extends back into the main roots and even into the base of the stem.
>
> Lateral roots affected by the rot mentioned above are invaded by a parasitic fungus, which enters from the soil and develops the minute threads of which its body is composed in and between the cells of the cortex. When a root becomes invaded by this parasite the cortical cells are killed as soon as the thread of the fungus reaches them. They quickly turn brown and collapse. This is especially marked in the large thin-walled cells of the inner layers. At a later stage the whole root appears blackened and shrunken as a result of the death of a large number of its cells; it can evidently no longer perform its work of taking in food, and decomposition rapidly sets in. The threads of the parasite are of two kinds The older ones are deep brown and comparatively large. From them arise finer colourless branches. All are divided into segments by transverse walls. In older stages masses of these brown threads become crowded together and divide frequently, so that a brown patch of fungus tissue is formed. In this at a still later stage, spore capsules are developed under the rind and these burst out to open on the surface of the root and discharge spores.
>
> The spores are rather large, egg-shaped bodies, colourless and single when young, but divided into two cells and deep brown when older. It is a species of the genus *Botryodiplodia*, of which several parasitic members are known.
>
> Quite recently Mr. F. A. Stockdale, Mycologist to the Imperial Department of Agriculture, West Indies, has described a similar and perhaps identical species as the cause of a cocoa-nut disease in Trinidad. The symptoms of this disease are on the whole similar to those described above, and it appears to be possible that both are really the same. There is no absolute experimental proof that the *Botryodiplodia* is the cause of the disease either in Travancore or in Trinidad. It is not even certain that the two are identical, as the scientific description of the latter has not yet been published. So far as can be gathered from Mr. Stockdale's report, the spores of his fungus were not found actually on the cocoa-nut roots, but only on the leaf petioles, though he attributes the death of the roots to a fungus found in them and apparently agreeing with that on the petioles. In Travancore, the *Botryodiplodia* was only found on roots and was obtained from diseased roots of areca as well as cocoa-nut palms. Spores were not found on roots actually in the soil but developed on diseased roots after these had been dug up and kept for some time. Only the early stages of formation of the spore capsules were found in freshly dug roots. The brown threads within the roots were found in these cases to communicate with the spore capsules, both immature and ripe, and there is no doubt that the threads in diseased roots belong to the *Botryodiplodia*. Scientific proof that this fungus is the cause of the disease can only be obtained by inoculating the roots of healthy palms with a culture of the fungus and thereby producing disease.
>
> The intensity of the disease differs greatly in different localities. It spreads most rapidly and is most severe in the low-lying, badly drained lands. The spread has probably occurred from one or a few centres, which were early attacked, and every evidence tends to prove that the disease is infectious. The spread of the fungus takes place in the soil. Cultivation hinders it, owing to the disturbance and consequent aeration of the upper layers of soil, and improved drainage is to be recommended.
>
> The remedial measures suggested consist of: (1) the destroying of all diseased material and so preventing infection of healthy palms, (2) the experimental trial of ordinary manures, supplemented by ammonium sulphate, lime, sulphur, and sulphate of iron, (3) improving the general health and vigour of the trees by high cultivation, (4) search for disease-resistant varieties, and (5) the prohibition of living plants and of roots (said to be used for fuel by metal workers and also as medicine) from disease infected areas.

Preliminary inoculation experiments conducted by Mr. Stockdale in the laboratories of the Imperial Department with the species of *Botryodiplodia* found at Trinidad, and subsequently also received from British Guiana, would indicate that this fungus is parasitic in habit, and may infect healthy roots of cocoa-nut palms. It is hoped, at a later date, to duplicate these experiments and then to issue a brief report on the results obtained.



GLEANINGS.

The cultivation of camphor trees now extends over an area of 900 acres in Ceylon. The area would be still larger but for the scarcity of seedling camphor trees. (*Messrs. Schimmel & Co.'s Report*, April 1908.)

Mr. George Fraser has been appointed Acting Agricultural Instructor at St. Vincent, in place of Mr. Thomas Osment, who has been transferred to the appointment of Warden of the Leeward Coast of the island.

It is stated in the *Demerara Chronicle* that the rice planters of the Corentyne coast of Berbice number over 1,300, and it is estimated that the total number of labourers engaged in rice planting in the colony reaches about 3,600.

The report dealing with the work of the Usine St. Marie, Martinique, states that during the season 1906-7, this factory handled 44,565 tons of cane, for which a price of \$3·12 per ton was paid. The canes gave a return of 8·40 per cent. of sugar.

The *Port-of-Spain Gazette* mentions that large areas of Crown lands have of late been taken up in the Naparima Ward Union district. Since the commencement of the financial year (April 1 last) 2,000 acres have been applied for—an average of over 650 acres per month.

From the beginning of the season up to July 2 last, 21,883 tons of sugar and 42,837 puncheons of molasses have been exported from Barbados, as compared with 23,752 tons of sugar and 54,520 puncheons of molasses, shipped during the corresponding period of 1907.

Reports from British Guiana are to the effect that more attention is being paid to cocoa-nut cultivation, and there is a steady increase in the exports. Dealers complain, however, that the nuts are too frequently delivered before they are fully ripe, and as a result the price obtained is lower than that commanded by nuts from Trinidad and Jamaica.

Bulletin No. 92 of the Florida Agricultural Experiment Station deals with the cultivation, manuring and utilization of sorghum. Certain varieties are shown to have given from 6 to as high as 19 tons of green forage per acre, or if allowed to mature, they have yielded from 500 to over 2,100 ℔. of grain per acre.

For the year ending June 30, 1907, home-grown farm produce, having a total value which reached the enormous figure of \$1,055,000,000 was exported from the United States. This represents an increase of \$79,000,000 as compared with the figures of the previous year. The value of the cotton exports was \$482,000,000.

Owing to the re-annexation of five estates by the Government of St. Lucia, a further area of 900 acres has now been added to the Crown lands of the island. These lands are on sale in lots of 5 acres or upwards, at £1 an acre, payable in four or more instalments.

Sea Island cotton is grown on a small scale in some districts of Porto Rico. The latest report on the Agricultural Experiment Station states, however, that the cotton area does not show signs of increase, and that it is difficult to interest planters in the cultivation of the crop.

Welcome showers of rain were experienced in St. Vincent about the middle of June, and cotton planters immediately started preparing their land for the coming season's crop. It is reported that notwithstanding the present drop in the price of cotton, the acreage planted will not be less than that of last year. Growers can obtain selected cotton seed at the Central Factory at 5c. per ℔.

An additional sum of \$10,000 (being part of a grant received from the United States) will next year be spent on agricultural education and experiment work in Porto Rico. The greater portion will be spent on the erection of buildings, the development of the Experiment Station, and in starting new lines of work. (*Porto Rico Times*, May 28, 1908.)

Half the sugar-cane area of India is situated in the United Provinces, but owing to the deficient rainfall experienced during the past year, the crop return in these Provinces has been unsatisfactory. Only 916,316 tons were yielded from an area of 1,481,737 acres, this being a decrease of 27 per cent., compared with last year's crop. India will therefore need increased sugar imports this year.

An article in the *Cuba Review* draws attention to the fact that owing to rapid exploitation, the supply of red cedar (*Cedrela odorata*) will soon be exhausted in Cuba, unless steps are taken to plant this tree on a much larger scale than is being done at present. The red cedar is a hardy, quick-growing tree, and will produce good timber on very poor soil. It is from the wood of this tree that the boxes for Cuban cigars are made.

The *Journal* of the Jamaica Agricultural Society (May last) mentions that the Society has obtained a small supply of Bengal beans for distribution within the island. This bean is used for green dressings, and in the experiments with leguminous crops conducted at Barbados in 1900 it gave the best return out of thirty kinds of plants tried. The Bengal bean grows like the Velvet bean, and gives almost as profuse a vegetation. It is adaptable, however, to a greater variety of soils.

Figures are given in the latest report of the Secretary of the United States Department of Agriculture in relation to the rapid growth of the beet sugar industry of the republic during the last twenty years. In 1887, the output of beet sugar was about 560 tons; in 1891, the quantity was 6,000 tons; in 1893, it was 22,344 tons; by 1897 it had reached 45,246 tons, and two years later, 81,729 tons. In 1901, the output had advanced to 184,606 tons, in 1903, to 240,604 tons, in 1906, to 483,000 tons, and in 1907, it reached 500,000 tons.

THE PRINCIPAL FUNGUS DISEASES OF CACAO.

Under the above title a leaflet giving in simple language particulars of the occurrence, symptoms, and methods of treatment of the chief fungus diseases affecting cacao in the West Indies, has just been issued by the Imperial Department of Agriculture. More detailed information may be found in the paper read by the Mycologist before the last West Indian Agricultural Conference and shortly to be published in the *West Indian Bulletin*, Vol. IX., No. 2.

The first portion of the leaflet is here reprinted, and the concluding portion will be given in the next issue of the *Agricultural News*:—

CANKER.

Occurrence.—All cacao-growing districts.

Symptoms.—The best time to look for canker would appear to be in the dry season immediately after a shower of rain. The brownish-coloured bark of the cankered areas does not dry as quickly as the unaffected portions of the bark, and the limits of affected portions may generally easily be ascertained. If several of these spots are carefully watched until quite dry, a keen observer may notice that the bark of cankered areas presents a peculiar dry brownish appearance. Subsequently these spots split or crack, and allow a brownish-red gummy fluid to ooze out. When this gum dries, it gives a dark rusty appearance to the bark. This is known as the 'bleeding' stage and the disease is now well established. Every effort should therefore be made to detect the disease, if possible, before the bleeding stage makes its appearance.

In Dominica, cacao plants are often noticed that produce on them a very large number of flowers which never set fruit, and what is known as the 'flowering' disease is observed. This in Dominica may be taken to be one of the first symptoms of canker, for it has been shown that such trees always eventually develop the disease.

If a cut is made into a 'canker' spot with a knife, it is found that the bark is dark claret in colour, and is moist and soft to the touch. The canker, as indicated by this discoloration, may spread round the stem or branch, or may extend in all directions. The discoloration extends to the wood of the tree, and it has frequently been noticed that the darkening of the wood may extend for some distance under what appears to be healthy bark.

When the rains set in, small pustules make their appearance and white, yellow, or red spores may be found. They can readily be distributed by wind or rain, and when they gain entrance to a wound they may set up disease.

Canker may affect a branch or a stem, and frequently several spots may be noticed on the same tree. When these diseased areas become numerous, the leaves become small and assume a yellowish hue. Branches frequently die off through having become 'ringed,' and not uncommonly whole trees, particularly when the diseased area is near the surface of the ground, are killed.

Canker is generally to be noticed more frequently among old trees, for wounds on such trees are generally the more numerous.

Spread.—Canker is caused by several fungi (*Nectria*, *Calonectria*, etc.) that have been shown to be wound parasites. The disease makes its entrance into a branch or stem through a wound.

Remedies.—The best time for canker work is during the dry season, but the disease should be constantly looked for and when the canker spots are detected, the diseased bark and wood should be cut out with a sharp pruning knife. The wound should be thoroughly treated with tar, or with a mixture of resin oil and manjak. After a tree has been treated, it should be marked by a ring of white-wash or white paint around one of the branches in order that it may be kept under careful supervision. The diseased portions that have been cut out should be collected and burned. They should not be allowed to remain on the ground at the foot of the tree. All dead trees or branches should be cut out, removed and burned. All treated trees should be inspected periodically, and further careful search for canker spots made. It is advisable that the knives used for cutting out canker should not be used for pruning, and they should be disinfected before they are put aside. As the fungi that are associated with canker are wound parasites, care must be taken with all wounds. Cuts made in pruning or while picking the crop should be tarred over. A joint of bamboo may be a convenient form to carry tar when pruning operations are being carried on. This may be carried in the left hand, and after a branch or sucker has been removed, tar can immediately be applied.

Experience has shown that the above remedial measures have proved successful, for estates, on which carefully conducted measures against canker have been carried on, have given increased crops and the number of cases of canker has been very largely reduced.

DIE-BACK.

Occurrence.—This disease is common in some islands; it occurs in St. Lucia, Dominica, Grenada, and St. Vincent.

Symptoms.—The disease commences in the younger twigs and spreads from these to the larger branches. The trees on which the younger twigs have been killed, present what is known as a 'stagheaded' appearance. If one of these dying twigs is cut lengthways by a knife, it will be seen that the end of the twig is black and is quite dead, and there occurs a brownish-coloured dying zone before the living tissues of the branch are reached. There is no sharp line of demarcation between dead and living tissues, as is noticed when twigs are killed by exposure to wind, etc. This intermediate zone of dying tissue makes it possible to readily detect the die-back disease.

In the rainy season, or even after a good shower, if these diseased twigs are closely examined, there will be noticed small black pustules breaking through the bark, from which a black dust—the spores of the fungus—may be obtained.

Spread.—The fungus (*Diplodia cacaoicola*) that causes this disease is a facultative parasite and can live on dead cacao wood. The spores are spread by means of wind and rain. There is also some connexion between attacks of this disease and cacao 'thrips.'

Remedies.—This disease does not readily attack trees in a vigorous condition of growth. Every effort should, therefore, be given to thorough cultivation, all diseased branches and twigs should be cut out and burned, and all wounds thus made should be followed by an application of coal tar or some similar substance. It has been demonstrated in St. Lucia that this disease can be entirely eradicated from an estate by high cultivation, manuring, and attention to careful pruning. Pen manures and mulchings should be applied, and all weeds should be carefully buried.

The husks or shells of all cacao pods should be buried with lime, for it has been shown that heaps of old pods lying unburied about a plantation serve as centres of infection for the spread of the fungus that causes this disease.

PRICKLY PEAR AS FOOD FOR STOCK.

The United States Department of Agriculture has given considerable attention to the matter of utilizing various species of *Opuntia* and other cacti as food for stock. Although in most countries where these plants grow they are regarded as intruders, and worse than useless, yet it is evident that they may be of much value to stock owners in times of drought, when little other succulent stock food is available. Much may be done by selection, too, to propagate the more spineless varieties, which can be utilized as stock food, without the preparation that is needed with the ordinary kinds, in order to render the spines inocuous. Since prickly pears occur in such abundance in the West Indies, the following note from the report (1907) of the Secretary of the United States Department of Agriculture may be of interest:—

As a special investigation the Office of Farm Management has made a study of the prickly pear as a farm crop during the year. Conservative estimates based upon actual feeding tests and upon yields obtained from cultivated fields show that 1 acre of cultivated pear will furnish rough fodder for one cow the year round. An average production of nearly 23 tons of green food per acre per annum has been grown upon the experimental grounds near San Antonio, Texas, during the past three years. The native growth has been used as stock feed for many years, but its cultivation was never attempted until three years ago. The response to cultivation has been remarkable, eight times as much forage having been produced upon cultivated ground as upon uncultivated ground. When it is considered that the crop economizes labour, that a plantation is good indefinitely when once established, that it can be fed in a succulent condition every day of the year, that it is relished by nearly all farm stock, and that it is extremely resistant to drought, it is clear that this crop must become an important adjunct to the live-stock industry of the south-west.

SEA-WEED AS A MANURE.

At the Conference of cotton growers which was held at Barbados in May last, reference was made to the question of utilizing sea-weed as a manure. This material is in most countries used for manurial purposes by agriculturists whose land is near the sea-coast, although the large content of water (65 to 80 per cent. in the fresh state) makes transport an expensive item for those living any distance inland. Sea-weed is used on a very large scale by farmers in many of the coast States of America, and a bulletin of the United States Department of Agriculture mentions that in Rhode Island, the annual value of the manure from this source has been estimated to be as high as $65,000.

Sea-weeds of different kinds naturally differ in their content of fertilizing constituents. Some of them contain a relatively high proportion of nitrogen, and others of potash, but as a general rule they are deficient in phosphoric acid.

In a publication issued by the Department of Agriculture of the Dominion of Canada, an analysis is given of sea-weed from the Canadian coast. This contained 27·93 per cent. of organic matter (including 0·468 nitrogen), 0·108 phosphoric acid, and 2·025 potash. In other words the amount of fertilizing constituents present was at the rate of 9·36 ℔. of nitrogen, 2·18 ℔. of phosphoric acid, and 40·5 ℔. of potash per ton. This must be considered a valuable manure on account of the large amount of potash and nitrogen contained, more particularly the former. For general agricultural purposes, however, and in order to make it a complete fertilizer it might, with profit, be supplemented by bone meal, which would supply phosphoric acid. As a green manure, the application of sea-weed would add largely to the humus in the soil, and undoubtedly improve the tilth or mechanical condition of the latter, more especially on very heavy or very light lands. It may be applied at the rate of 20 or 30 tons per acre.

If the sea-weed is spread in thin layers on the shore, and allowed to dry for a day or two, it may with economy be carted much longer distances than when in the perfectly fresh state.

When sea-weed is burnt, the nitrogen is lost, but the potash and phosphoric acid remain behind in the ash. Analysis of the ash of the Canadian sea-weed showed that it contained 1·27 per cent. of phosphoric acid, and 23·61 per cent. of potash, together with 7·69 per cent. of lime. The proportion of potash is considerably higher than that in ordinary wood ashes, usually valued on account of their content of this fertilizing constituent.

In the case of land at some distance from the shore, therefore, which it is thought, would especially benefit by the application of potash, it would probably be found economical to forego the organic matter, and reduce the sea-weed to ash, a ton of which, on the basis of the above analysis, would contain over 500 ℔. of potash, and about 28 ℔. of phosphoric acid.

In reference to the use of sea-weed by estate owners in the West Indies, Professor d'Albuquerque mentioned, at the Cotton Growers' Conference above referred to, that a sample of West Indian sea-weed, partially dried in the sun, analysed by him contained 49·5 per cent. organic matter, 0·78 per cent. nitrogen, 0·37 per cent. phosphoric acid, and 0·36 per cent. potash. The manurial value of this material, according to the scale of the Barbados Agricultural Society, would work out at about $3 per ton.

BRAZILIAN COFFEE.

The Brazilian coffee industry is in an unsatisfactory condition as a result of the enormous over-production which took place last year. The cultivation is carried on chiefly in the State of Sao Paulo, and the Government of that State has lately organized a board of four members, known as the 'Administrative Board of the Coffee Propaganda Department,' to assist growers, as far as possible, to meet the present situation in the coffee industry. The following are the principal functions assigned to this board:—

To study the conditions of the coffee markets, and to lay before the Secretary of Agriculture such proposals as the board may consider advisable for the stimulation of consumption, either by developing existing markets, or creating new ones. To be constantly studying every possible measure that may have an influence in increasing the consumption of coffee, and to devise means whereby the advantages of using coffee may become more widely known.

To organize travelling exhibitions which shall visit the principal coffee markets under the direction of a member of the board, to show the various products of the State of Sao Paulo, and to exhibit cinematograph views illustrative of the development and civilization, the agriculture and the industries of the State.

THE DESTRUCTION OF RATS.

The question of rat destruction by traps and other means is discussed in the following extracts from *Farmers' Bulletin 297*, of the United States Department of Agriculture, which form a continuation of the particulars given in the last number of the *Agricultural News*, in reference to the destruction of these pests by various poisons :—

Trapping, if persistently followed, is one of the most effective methods of destroying rats. The improved modern traps with a wire fall, which is released by a baited trigger and driven by a coiled spring, have marked advantages over the old forms, and many of them may be used at the same time. These traps, sometimes called guillotine traps, are of many designs, but the more simply constructed are to be preferred. Probably those made entirely of metal are the best, as they are less likely to absorb and retain odours.

In illustration of the effectiveness of traps, it may be related that a year or two ago a large department store in Washington experienced heavy losses of gloves, lace curtains, and other merchandise from rat depredations. For several months the damage amounted to from $10 to $30 nightly. After many unsuccessful attempts to abate the nuisance the managers were advised to try the improved traps. As a result 136 rats were killed during the first twenty nights, when the losses practically ceased, and the method has been continued in the store ever since with satisfactory results.

Guillotine traps should be baited with small pieces of bacon, sausage or cheese. The trigger wire should be bent inward to bring the bait into proper position to permit the fall to strike the rat in the neck.

Other excellent baits for rats are oatmeal, toasted bread (buttered), and sunflower or pumpkin seeds. When seed, grain or meal is used with the guillotine trap, it may be placed on the trigger plate, or the trigger wire may be bent outward and the bait sprinkled under it.

Wire cage traps (French) are also useful for catching rats, but in the long run the kinds recommended above are much more effective. While trapping is in progress, all other articles of food should be removed from the neighbourhood of the trap, and the bait should be changed often. Rats are very suspicious, and baits and traps should be handled as little as possible. Increased success may be secured both in trapping and poisoning if the rats are fed for a night or two with the kinds of food to be used for bait.

When attack is made upon rats by means of dogs, a ferret is often very useful for the purpose of driving the rats out of burrows and other hiding places so that the dogs can capture them. An experienced person having the help of dogs and ferrets trained to work together is often very successful in destroying the pests.

In the rice fields of the far East the natives build numerous piles of brush and rice straw and leave them for several days until many rats have taken shelter in them. A portable bamboo enclosure several feet high is then set up around each pile in succession, and the straw and brush are thrown out over the top while dogs and men kill the trapped rodents. Large numbers are killed in this way, and the plan, with modifications, may be utilized in other parts of the world with satisfactory results. A wire netting of fine mesh may be used for the enclosure.

Rats may be destroyed in their burrows in the fields and in ditches, by the use of carbon bisulphide. A wad of cotton or other absorbent material is saturated with the liquid and pushed into the burrow, the opening being packed with soil to prevent escape of the gas. All animals in the burrow are asphyxiated. Fumigation in buildings is not so effective, as the gas cannot readily be confined.

By the persistent use of traps, occasional resort to poison, and the exercise of forethought in the construction of estate buildings so as to minimize the opportunities for harbourage, farmers and others may prevent the greater part of the loss and annoyance they now experience from rat depredations. The same statement applies in great measure to city and village conditions. Hence co-operation in the warfare on rats is particularly important and cannot be too strongly urged.

BRITISH GUIANA RICE CROP.

The fortnightly report of Messrs. Sandbach, Parker, and Co., of Georgetown, dated June 26 last, contains the following notes on the present conditions, and prospects of the rice cultivation in British Guiana :—

The weather during the fortnight has been showery, and suitable for growing crops. The young cultivation looks well, and with a continuance of favourable weather, there should be an excellent crop this year. The area in cultivation is much larger than last or any previous year.

Local demand continues brisk, and prices remain unaltered.

Shipments to the islands during the fortnight amount to only 160 bags, and contracts are nearly all completed. No fresh sales to the islands have been reported this fortnight.

The local market is somewhat better supplied with cleaned rice, as a good many mills have been doing a little work with paddy from the 'short crop,' but this has not affected prices.

We quote to-day, f.o.b. Demerara, per bag of 180 lb. gross, 23*s.* 6*d.* to 24*s.*; per bag of 164 lb. 21*s.* 10½*d.* to 22*s.* 4½*d.*, good export quality rice.

RICE PRODUCTION IN THE UNITED STATES.

The following notes deal with the rice crop of the United States for the year 1907, and are taken from the latest report of the Secretary of Agriculture :—

Rice is the twelfth crop in point of value this year, and in both quantity and value the crop is a record one. The preliminary estimate is a production of 21,412,000 bushels of rough rice, or 963,540,000 lb.—an amount a little above the great crop of 1904, and 98 per cent. above the average crop of the previous three years. This year's crop is worth $19,500,000 to the farmers, or 36 per cent. above the three-year average.

The exports in the fiscal year following the crop year 1904 were 75,000,000 lb. of cleaned rice, 4,000,000 lb. in 1906, and 2,443,000 lb. in 1907. The imports of rice, less the foreign and home-produced exports were about 64,000,000 lb. yearly from 1900 to 1903, and about 62,000,000 lb. in 1904. After the crop of 1904, the tide turned, and in 1905 there were net exports amounting to 41,000,000 lb. followed the next year by net imports of 43,000,000 lb., and in 1907 of 61,000,000 lb. The only year before 1907 when the production was greater than the consumption was 1904, and the production in 1907 is greater than in that year. The Department of Agriculture has been helping the rice grower to get better varieties from the Orient, which will change imports into exports.

MARKET REPORTS.

London,—June 23, 1908, 'The West India Committee Circular; Messrs. E. A. de Pass & Co., June 12, 1908; Messrs. Kearton, Piper & Co., June 23, 1908.

Arrowroot—2¼*d.* to 3¼*d.*
Balata—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8 per lb.
Bees'-wax—Good quality, £7 17*s.* 6*d.* to £8 per cwt.
Cacao—Trinidad, 63/- to 80/- per cwt.; Grenada, 59/- to 65/- per cwt.
Coffee—Santos, 28*s.*; Jamaica, 48/- to 52/- per cwt.
Copra—West Indian, £16 10*s.* per ton.
Cotton—St. Vincent, 15*d.* to 16*d.*; Barbados, 14½*d.* to 15½*d.*; St. Kitt's, 14½*d.* to 15½*d.*; Montserrat, 14*d.* to 15*d.* per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—4/6 to 5/- per box of 200.
  Pine-apples—St. Michael, 2/3 to 4/- each.
  Grape Fruit—12/- to 14/- per box.
  Oranges—Jamaica, 11/- to 12/- per box.
Fustic—£3 10*s.* to £4 10*s.* per ton.
Ginger—51/- to 80/-
Honey—20*s.* to 32*s.* per cwt.
Isinglass—West India lump, 1/10 to 2/1 per lb.; cake, 11½*d.* per lb.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £12 10*s.* per cask of 108 gallons; Distilled oil, 2/- per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10*s.* to £4 5*s.* per ton; roots, £2 10*s.* to £3 10*s.* per ton.
Mace—1*s.* 1*d.* to 1*s.* 2*d.* per lb.
Nutmegs—66's to 68's, 8*d.* to 8½*d.*; 70's, 6*d.*; 91's, 5*d.*; 103's, 4½*d.*; 121's, 3½*d.*; 149's, 3¾*d.*
Pimento—Quiet; 2¼*d.* to 2½*d.*
Rum—Jamaica, 3/- to 8/-; Demerara, 1/6 to 1/7½ per gallon; Trinidad, no quotations.
Sugar—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 15/11½; Molasses, 14/- to 14/6.

New York,—June 26, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 13c. to 14½c.; Grenada, 12½c. to 13¾c.; Trinidad, 12¾c. to 14c.; Jamaica, 11c. to 13c. per lb.
Cocoa-nuts—Jamaica, select, $23·00; culls., $14·50; Trinidad, $22·00; culls, $14·00 per M.
Coffee—Jamaica, good washed, 9c. to 11c.; good ordinary, 7¾c. to 8¼c.
Ginger—10¾c. to 14c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c., dry flint, per lb.
Grape Fruit—Jamaicas, $3·00 to $4·50 per box and $5·00 to $8·00 per barrel.
Limes—Dominica, $6·50 per barrel.
Mace—19c. to 31c. per lb.
Nutmegs—110's, 9c. per lb.
Oranges—Jamaica, $1·70 to $3·00 per barrel.
Pimento—4¼c. per lb.
Sugar—Centrifugals, 96°, 4·40c.; Muscovados, 89°, 3·90c.; Molasses, 89°, 3·65c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., June 30, 1908; Messrs. T. S. Garraway & Co., July 4, 1908.

Arrowroot—St. Vincent, $4·00 to $4·10 per 100 lb.
Cacao—Dominica, $14·00 to $15·00 per 100 lb.
Cocoa-nuts—$18·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $10·50 per 100 lb.
Hay—$1·65 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—Choice, 19c.; Fancy, 21c. per gallon
Onions—Bermuda loose, $1·10 to $1·20 per 100 lb.
Potatos, English—$3·00 per 160 lb.
Peas—Split, $6·25; Canada, $3·20 per bag.
Rice—Demerara, $6·15 (180 lb.); Patna, $3·80; Rangoon, $3·00 per 100 lb.
Sugar—Muscovado, 89°, $2·05 per 100 lb., package included; Dark crystals, $2·50; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—June 27, 1908, Messrs. Wieting & Richter.

Arrowroot—St. Vincent, $9·50 to $10·00 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 16c. to 18c. per lb.
Cassava—80c.
Cassava Starch—$9·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole, 12c. to 13c.; Jamaica, 12c. per lb.
Dhal—$5·90 to $6·00 per bag of 168 lb.
Eddos—90c. per barrel.
Molasses—Yellow, 23½c.; Dark, no quotations.
Onions—Madeira, 2¾c.; Lisbon, 2½c. to 3c.; Dutch, 3c. per lb.
Plantains—36c. to 60c. per bunch.
Potatos,—English, $2·60 to $2·75 per barrel.
Potatos, Sweet—Barbados, $1·68 per bag.
Rice—Ballam, $6·40; Creole, $5·75 for good; Seeta, $6·00 per bag.
Split Peas—$6·25 to $6·50 per bag (210 lb.); Lisbon, $4·50
Tannias—$1·44 per bag.
Yams—White, $2·16; Buck, $4·00 per bag.
Sugar—Dark crystals, $2·50 to $3·00; Yellow, $3·25 to $3·50; White, $3·70 to $3·80; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·60 to $5·75 per M.
———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—June 27, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$13·25 to $14·25 per fanega.
Cocoa-nuts—$20·00 per M., f.o.b.
Cocoa-nut Oil—60c. per Imperial gallon, cask included.
Coffee—Venezuelan, 9c. to 9¼c. per lb.
Copra—$2·50 to $2·75 per 100 lb.
Dhal—$4·90 to $5·00 per 2-bushel bag.
Onions—$1·75 to $1·90 per 100 lb. (retail).
Potatos, English—$1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·65; White, $4·90 to $5·75 per bag.
Split Peas—$5·85 to $6·00 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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Manurial Experiments with Cacao at Dominica.

THE results of the manurial experiments with cacao that have now been in progress for many years at Dominica, both at the Botanic Station and in country districts, are well worthy of study by planters, since they demonstrate beyond a doubt the remunerative returns obtained by judicious applications of manure to cacao plantations. Attention may here be drawn to the most important and interesting features in the results, further particulars of which will be found in a paper by Dr Francis Watts, C.M.G., that appears in the *West Indian Bulletin*, Vol. IX, p. 138.

The manurial experiments at the Station have been carried out on uniform lines since the year 1900, and there are five cacao plots under observation. Of these, one has been regularly manured each year with an application of 4 cwt. of basic phosphate and 1½ cwt. of sulphate of potash per acre; a second plot has been annually treated with 4 cwt. of dried blood per acre, and a third has received a complete manure, composed of 4 cwt. of basic phosphate, 1½ cwt. of sulphate of potash, and 4 cwt. of dried blood per acre. The fourth plot has been annually mulched with grass and leaves, while the fifth has received no manure whatever.

The crop returns obtained, which have been recorded since 1902-3, clearly indicate the value of manures to cacao plantations. This may easily be seen from a comparison of the returns yielded by the several manured plots during the five years ending 1906-7, with the return given by the unmanured plot. The use of dried blood alone (plot 3), which is primarily a nitrogenous manure, resulted in an increased yield of 187 lb. of dry cured cacao per acre per annum, as compared with the unmanured plot. If the dry cacao is valued at the moderate figure of 6*d*. per lb., the net profit obtained as the result of the application of the dried blood, after deducting the cost of the manure, works out at 57*s*. 6*d*. per acre.

The use of phosphate and potash on the first plot has given an increased crop yield which, on the average of the past five years, is equal to 219 lb. of cured cacao per acre per annum over and above that given by the unmanured plot. The net return obtained from manuring (after deducting the cost of the manure) is, on the above basis, equal to 64s. 3*d*. per acre.

The combination of the organic and the mineral manures, i.e., dried blood, phosphates and potash, on the third plot, has shown an increased yield of 374 lb. of dried cacao per acre per annum, and a net monetary profit of 105s. 9*d*.

The highest return of all, however, was, it is interesting to note, given by the plot that was mulched with grass and leaves. In this case the average gain for the past five years in dry cacao per acre per annum over the unmanured plot reached 402 lb. When the cost of the manure has been deducted, there remains a sum of 141s., representing the net profit derived from the mulching treatment.

The results obtained in 1906-7 indicate, however, that the average figures for the past five years do not fully represent the gain derived from mulching in cacao plantations, and it would appear that the benefits resulting from this method of treatment are cumulative. During the season 1906-7 the mulched plot yielded 648 lb. of dry cured cacao in excess of the unmanured plot, which, on the basis already mentioned, represents a net profit of 264s.

Further it is pointed out by Dr. Watts that when the general health and growth of the trees on the plots are taken into account, it is at once seen that the individual trees on the mulched plot are much finer and better developed than those which received the mineral manures. The soil which has received the mulching treatment is moist, friable, full of humus, and in a better condition generally, as compared with the other plots. It is also significant that the mulched plot is well covered by trees planted at the rate of 108 per acre, while the plot receiving no manure requires 178 trees per acre, or nearly 70 per cent. more. The trees on the plot receiving phosphate, potash, and dried blood come next to those on the mulched plot as regards general health and condition. Although the dressings of leaves and grass have given such excellent results, it is pointed out that in many cases it will probably be well to supplement mulching with moderate applications of nitrogen and phosphate.

The experiments carried out in the country at Picard show beyond doubt that manures are beneficial in the establishment of young cacao plantations. The use of pen manure brought about the best returns, and the trees on the plots receiving this treatment were more healthy and vigorous than on other plots. Dried blood and bone meal were also especially beneficial, both in increasing the yield of cacao and in improving the condition of the trees, while considerably increased returns, as compared with the no-manure plot, were given by the trees to which basic phosphate and ammonia, both separately and in combination, were applied. The trees on the plots manured with phosphate and potash, both separately and in combination, are described as being poor in foliage and lacking vigorous growth.

On one set of plots at Picard the utilization as green dressings of the weeds growing under the young cacao trees has proved of great value in maintaining and improving the condition of the soil. The weeds are allowed to grow until they reach a moderate size, when they are either cut down and spread as a mulch, or forked in.

One of the chief conclusions that may already be deduced from the results obtained in these experiments is the importance of keeping up and increasing the supply of humus in the soil. For this reason, manures supplying organic matter, and especially pen manure, are particularly desirable. Nitrogenous manures are essential for cacao, as without nitrogen the trees lack vigour: this constituent should preferably be given in a slowly available form, e.g., as dried blood or cotton-seed meal. Phosphatic manures increase the crop, but should not be used without nitrogen. As regards potash, this constituent is probably not urgently required as a manure for cacao in Dominica.

SUGAR INDUSTRY.

Analysis of Cane Juices from St. Kitt's Estates.

In reference to the note on cane juice analysis at St. Kitt's that appeared in a recent number of the *Agricultural News*, Vol. VII, p. 184, the following further particulars on the subject have been received from Dr. Francis Watts, C.M.G.:—

> In the past little or no information has been available respecting the character or efficiency of muscovado estate working in St. Kitt's. In view of the interest at present being shown in the question of the substitution of the Central Factory system for the older muscovado method, it has become a matter of some importance that definite information on this subject should, if possible, be acquired,

When Mr. H. A. Tempany, B.Sc., was in St. Kitt's during April and May last, in connexion with the reaping of the sugar-cane experiments there, an effort was made to organize a plan for obtaining the desired information. A circular was issued by Mr. Shepherd, Agricultural Superintendent of St. Kitt's, acting in conjuction with Mr. Tempany, inviting the co-operation of planters in this project. In the circular the desired object was stated, and directions were given for taking average samples of juice for analysis.

In all some eight estates responded to the invitation and sent samples of juice to the laboratory for analysis; these samples were representative of the average composition of the juice passing into the works during one week.

The juices were analysed and a memorandum of the results was forwarded by Mr. Tempany to the senders. In this memorandum were given the composition of the juice, the number of gallons that would be required to make 1 ton of muscovado sugar, and the total weight of sugar that should have been made during the week, under satisfactory working conditions, together with any other points worthy of note.

It was found that the sucrose content of the various juices examined, ranged from 1·58 to 1·91 ℔. per gallon, the purities from 86 to 89, and the glucose ratios from 1·6 to 6·5. On the whole, the juices showed a tendency towards unripeness, a result, in all probability, attributable to the unsuitable weather conditions experienced during the preceding growing season.

Molasses as a Fertilizer for Sugar-cane Lands.

The following paper on the value of molasses as a fertilizer for sugar-cane lands has been sent to the Imperial Commissioner of Agriculture by Mr. W. P. Ebbels, of Mapore, Mauritius, and is of special interest in connexion with the article 'The Nitrogen Cycle and Soil Organisms' which appeared in the *West Indian Bulletin*, Vol. VIII, p. 94. The molasses which has been utilized in this way is that resulting from the vacuum-pan process of sugar making in central factories, and not muscovado molasses:—

Molasses has for a long time been looked upon as a valuable fertilizer for sugar-cane lands in Mauritius. On the basis of five analyses, the results of which are given in the *Annual Report* of the Station Agronomique, for 1897, it would appear that Mauritius molasses contains from 6·27 to 9·37 ℔. of nitrogen, from 23·14 to 26·62 ℔. of potash, and from 0·79 to 0·88 ℔. of phosphoric acid per 100 gallons. The report further states: 'All the planters who use molasses as manure are satisfied with the results obtained, and it is astonishing that the practice is not more general.'

The method of applying molasses varies. In some cases about a litre is poured into each cane hole where the cuttings are to be planted two or three months later. A second method is to apply it on the surface between the cane rows, which are about 5 feet apart. A third method is to make a mixture composed of scum cake from the filter presses, ashes from the megass furnaces, and molasses: about half a kilo. is put into each cane hole at the time of planting, or in some cases, it is applied direct around the cane stool instead of farmyard or chemical manure.

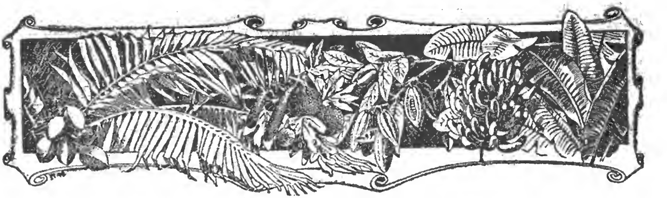
It always seemed, however, that the results claimed for the use of molasses as a fertilizer exceeded what could reasonably be expected from the plant food shown by analysis to be present in it, and on reading a paper 'The Nitrogen Cycle and Soil Organisms' by Mr. S. F. Ashby, B.Sc., which appeared in the *West Indian Bulletin*, Vol. VIII, No. 1, it occurred to me that if the soil organism *Azotobacter chroococcum*, described in the course of this paper, existed in the soil here, it might, through the energy derived from the oxidation of the sugar contained in the molasses, be enabled to fix a much larger amount of atmospheric nitrogen in the soil than it would do under natural conditions. This would account for the excellent results said to have been obtained. I therefore got our chemist, M. L. Fauque to go into the matter, and the result of our investigations seems to point to this being the case.

The first thing was to ascertain if the particular organism existed in the soil here. Proceeding in the manner indicated we found an organism which appeared to answer the description, except that it did not take up the iodine stain well, although it took up aniline blue with great intensity. However, as nitrogen was found to have been fixed in a fairly pure culture of this bacterium, it was clear that if we had not got the organism described, we had an allied variety possessing the same powers for the fixation of atmospheric nitrogen.

In 1903, having a large quantity of molasses which we were unable to dispose of in any other way, some of it was mixed with the waste water from the factory and run on a part of a field then under beans. This field was planted with cane the following year and the part which received the molasses has always given a better yield than the rest of the field which received none. Last month samples of the soil from both parts of the field were taken for analysis, and the sample from the part to which molasses had been applied four and a half years before was found to contain 5·72 parts of nitrogen per 1,000 of dry soil, while that from the part which had not received molasses contained only 3·36 per 1,000. Cultures started with these soils showed the presence of the Azotobacter organism in large numbers, and as the field has received the same treatment from end to end, there is no reason to suppose that the larger amount of nitrogen in the portion of the field treated with molasses is due to anything but the molasses and the work of this organism.

With the object of establishing the connexion between the organism and the sugar of the molasses, a quantity of soil in which the organism existed, was taken, and after thorough mixing, two samples of 500 grammes each were weighed out for experimental purposes. Into one of these a solution containing 10 grammes of sugar was introduced and thoroughly mixed with it. Sufficient distilled water, free from ammonia, was mixed with the other sample to bring them both to about the same degree of moisture, and the two samples were kept under exactly similar conditions, in shallow dishes lightly covered with sheets of paper so as to exclude the light. Both samples were analysed fourteen days later, when the sample into which the sugar had been introduced was found to contain 4·07 parts of nitrogen per 1,000 of dry soil, and the other 3·91. Twenty-five days later they were again analysed when the sample which had received the sugar showed 4·55 parts of nitrogen per 1,000 of dry soil, and the other 3·92 parts of nitrogen.

It would be very interesting if these results could be checked, as they seem to indicate that molasses is a very valuable fertilizer for soils which contain the *Azotobacter chroococcum*, but it is only by properly conducted experimental work that the proper quantity to use and the best method of applying it can be determined. It would appear, however, to be necessary to spread the molasses over as large an area as possible and to work it into the upper layer of soil.



WEST INDIAN FRUIT.

PINE-APPLE CANNING INDUSTRY IN THE HAWAIIAN ISLANDS.

The raising of fruit for export to California and the mainland generally is rapidly becoming an important industry in the Hawaiian Islands. Returns relating to the trade of the Territory show that the value of the exports of fruits and nuts during 1906-7 increased by nearly £20,000 as compared with those of the previous year, and this advance is mainly accounted for by the increased shipments of canned pine-apples. The following notes on the progress of the pine canning industry of the territory are extracted from the latest report of the British Consul at Honolulu:—

Pineapples were first grown in the Hawaiian Islands in 1890, near Pearl Harbour, with the object of shipping the green fruit to the mainland. Owing to the unsatisfactory steamer service, however, the project was not a success, and it was not until 1899 that the systematic raising of pineapples was begun at Wahiawa. The summer of 1901 saw the starting of the enterprise on a large scale by the Hawaiian Pine-apple Company, and two years later this company produced 1,800 cases of canned pine-apples. (The standard case contains 24 cans, each of which are 4½ inches high by 4 inches in diameter.) The company's output continued to grow steadily, being 8,500 in 1904, 25,000 cases in 1905, 36,000 cases in 1906, and 103,000 cases in 1907.

In the last-named year the canning factory was removed to Honolulu, where already large extensions are being made to meet the requirements of the increasing demand for the company's products. The pine-apples are brought by rail from Wahiawa in uncovered boxes, packed on open cars, to the company's siding alongside the factory. Throughout the processes of peeling, slicing, packing in cans, etc., the fruit is never touched by the human hand: all the working people employed in those departments wearing india-rubber gloves. The syrup put into the cans is made from refined sugar, and throughout the preparation of the goods every care is taken to provide an article of the highest quality. There are now, in addition to the above-named company, seven others engaged in the industry, the total output of the islands in 1907 having been 190,000 cases, valued at £120,000. The estimated output for 1908 is 350,000 cases, of a value of £220,000. The market for these goods is almost entirely in the United States, as the high cost of labour militates against successful competition with the Singapore canned pine-apple. Some small shipments have, however, been made to the United Kingdom, and, owing to their superior flavour, have met with a favourable reception in spite of the fact that the Hawaiian article is double the price of the Singapore one.

WEST INDIAN PRODUCE AT THE COLONIAL FRUIT SHOW.

The Royal Horticultural Society held a show of Colonial fruit and other produce in London on June 11 and 12 last. A prominent feature in the exhibition was the magnificent display of limes sent by the Permanent Exhibition Committee of Dominica, to which a silver-gilt Knightian medal was awarded. Many individual exhibits were also sent from Dominica, and among these, that of the Dominica Fruit Growers' Association was adjudged the best, and was awarded a silver Banksian medal, bronze Banksian medals being awarded to the Hon. J. Cox-Fillan and Mr. A. D. Riviere.

The gold medal of the Royal Horticultural Society was given to the West Indian Produce Association for their splendid collection of West Indian commodities, which included fresh fruit, preserves, cigars, jippi-jappa hats, etc.

The management of the exhibits sent in from Dominica was undertaken by the West India Committee, and the illustration which appeared in the *West India Committee Circular* of June 23 last testifies to the skill and taste shown in displaying the produce in an attractive manner. In order to give visitors an opportunity of testing the merits of Dominica limes, a considerable quantity of the fruit was distributed among those present, and lime squashes were also dispensed.

The fruit remaining over at the close of the exhibition was utilized with the object of making this product more widely known, and nearly a hundred packages were despatched to notable persons, and to hospitals and other institutions. West Indian limes are becoming more widely known in England every year, and as pointed out by the *West Indian Committee Circular*, the British market can take any quantity of produce from these colonies, provided it is well prepared and put up, and that a constant supply can be maintained.

The next Colonial Fruit Show will be held in London on November 26 and 27, and since really fine collections of West Indian produce will be available at that time, it is hoped that the Permanent Exhibition Committees throughout the islands will make an effort to be well represented at the exhibition.

SPINELESS LIMES AND ORDINARY LIMES.

An article on the characteristics of the spineless variety of lime as compared with the ordinary kind appeared in the *Agricultural News*, Vol. VII, p. 84, and it was there mentioned that fuller particulars on the subject, together with data as to the relative purity and richness in citric acid of the juice of the two varieties were included in the *Report* for 1906-7 of the Dominica Botanic Station.

Spineless limes are believed to have originated on the Shawford estate, Dominica, where, in the year 1891, a lime tree was noticed from which the usual spines were absent. Care was taken to produce seedlings from this interesting tree, and about 75 per cent. of the plants proved themselves to be spineless. The young trees fruited well, although the limes yielded were smaller in size than those from the ordinary variety. Apart from the absence of spines, this lime is characterized by the smallness of the leaves, an erect habit of growth, a smooth, thin skin, a greater richness of juice, and the presence of but a small number of seeds as compared with the ordinary variety.

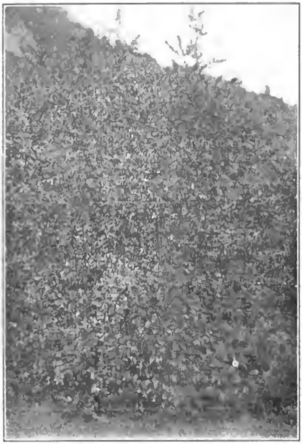


FIG. 5. ORDINARY LIME TREE.

The accompanying illustrations (Figs. 5 and 6) show the different habits of growth of the two kinds of limes. Fig. 5 represents an ordinary variety possessing spines. In Fig. 6 appears a spineless lime, and the more erect and less spreading habit of growth of this variety in comparison with that of the ordinary kind is well shown. It should be mentioned that this upright character is more marked in the earlier stages of growth of the trees, and that as the latter grow older and bear fruit, the branches tend to bend downwards, thus altering materially the appearence of the trees. The photographs from which the blocks for these illustrations have been prepared were forwarded by Mr. Joseph Jones, Curator of the Botanic Station, Dominica. They represent trees growing on the Bath estate in that island.

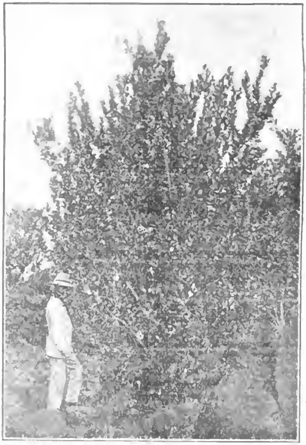


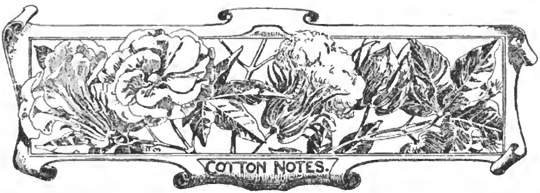
FIG. 6. SPINELESS LIME TREE AT DOMINICA.

There are now over 20,000 trees, or about 100 acres, of the spineless variety of lime growing in Dominica, and information, based upon observations made on large field plots should soon be forthcoming. In 1906-7, the number of plants of this variety sent out from the Botanic Station reached 10,087. Mr. Jones reports that the demand for plants continued steady throughout 1907-8. There is little doubt that the absence of spines from the tree is a character to be appreciated, and one which should facilitate the gathering of the fruit.

DEPARTMENT NEWS.

Mr. Joseph Jones, Curator of the Botanic Station, Dominica, left for England on July 15, by the R.M.S. 'Thames,' on three months' vacation leave of absence.

Mr. Alleyne G. Howell, Chief Clerk at the Head Office of the Imperial Department of Agriculture, also sailed for England by the 'Thames' on six months' leave.


COTTON NOTES.

WEST INDIAN COTTON.

Planters will be glad to note by the accompanying letter from Messrs. Wolstenholme & Holland, dated July 6, that an improved condition of affairs has lately prevailed on the Liverpool Sea Island cotton market:—

Since our last report a good business has been done in West Indian Sea Island cotton, and about 780 bales have been sold at steady prices.

The enquiry has been mostly confined to the better medium grades at 14*d.* to 15*d.*, very little having been sold above the latter figure. A fair quantity of stains have been sold at 7*d.* to 8*d.* per lb. The sales include Anguilla, 15*d.*; Antigua, 15*d.*; Barbados, 14½*d.* to 15½*d.*; Montserrat, 15*d.* to 15½*d.*; Nevis, 14¼*d.*; St. Croix 14*d.* to 14¾*d.*; St Kitt's 14¾*d.* to 15¼*d.*; and St Martin, 14*d.* to 15*d.*

ARRIVAL OF COTTON GINNERY PLANT AT ST. LUCIA.

The *Voice of St. Lucia*, of July 4, contained the accompanying note:—

A complete Cotton Ginnery, with oil engine and all accessories has been received from Oldham, England, by Messrs. Macfarlane, Junior & Co., of St. Lucia. The building to contain the plant will be set up in Castries between the new Public Works Yard and the Riverside Cemetery, facing the Castries river, and work on this is to commence at once. It is intended that everything shall be ready for taking off the cotton crop to be picked in the early months of 1909.

The establishment of this ginnery should certainly be a stimulus to cotton-planting operations in the island, and it is greatly to be hoped that the industry and this new venture of Messrs. Macfarlane, Junior & Co., will meet with the success deserved.

COTTON CONFERENCE IN ENGLAND.

The Conference of cotton growers and spinners which has been arranged under the auspices of the British Cotton-growing Association will be opened at Manchester on August 5, and, as remarked by the *West India Committee Circular*, should prove useful in giving cotton growers some insight into the present position and prospects of the market for Sea Island cotton.

Sir Daniel Morris, K.C.M.G., will attend the Conference, and the West Indian delegates who have been nominated by the Agricultural Societies include:—Barbados: Hon. Forster M. Alleyne, Dr. C. E. Gooding, Mr. Alistair Cameron, Mr. T. W. B. O'Neal, and Mr. J. R. Bovell; St. Vincent: Hon. Conrad J. Simmons, Mr. Alexander Smith, Mr. Duncan MacDonald, Mr. H. Hayward, and Mr. W. N. Sands; Antigua: Hon. E. St. John Branch, Hon. J. J. Camacho, Mr. R. Bryson, Mr. E. T. Cole, Mr. F. Holborow, Mr. A. M. Lee, Mr. J. W. A. Maginley, and Mr J. Dew; and Montserrat: Mr. J. T. Allen, and Mr. S. W. Howes.

COTTON CONFERENCE AT ANTIGUA.

A Conference of cotton growers was held at the Agricultural and Commercial Society Room, Antigua, on June 15 last, for the purpose of considering the position and prospects of the cotton industry in the island. Dr. Francis Watts, C.M.G., presided, and the meeting was largely attended.

Dr. Watts in the course of his address referred to the fact that the market for Sea Island cotton was at present somewhat depressed, which had resulted in the production of a tendency towards the reduction of the area under cotton cultivation. The low prices, however, were not due to over-production, and the markets were undoubtedly improving and sales were being more readily effected. There was no danger of over-production of Sea Island cotton in the West Indies at present. Moreover, he reminded those present that, in 1903, when the cotton industry was started, it was estimated that the price likely to be obtained for their product was about 1*s.* to 1*s.* 2*d.* per lb., and on this basis the remunerative character, or otherwise, of the industry had been calculated. It was evident, therefore, that it was too early to complain when market prices were still at 14*d.* to 15*d.* per lb.

The past season had undoubtedly been unfavourable to cotton growers in Antigua; weather conditions were unpropitious, and in addition, a new and serious insect pest which caused the flower-bud-dropping disease had been noticed for the first time. The severity of attack from this insect was probably due to the peculiar seasonal conditions, and with more favourable weather it was believed that its ravages would be largely reduced. Mr. H. A. Ballou, M.Sc., Entomologist to the Imperial Department of Agriculture, had to a large extent worked out the life-history of the fly causing the flower-bud-dropping disease, and suggested a number of remedial measures for the control of the insect during the coming season. Chief among these was the application of 'Vaporite' to the soil, which would probably destroy the fly in the pupal stage, which takes place in the ground.

The cotton worm still caused trouble but this could be readily held in check by the use of Paris green and lime. As for the leaf-blister mite, it had been shown that this could be controlled by timely hand picking of diseased leaves, and by the application of sulphur and lime to infected plants.

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WEST INDIAN AGRICULTURAL CONFERENCE, 1908

Planters in Antigua were experiencing difficulties owing to the present scarcity and unreliability of the labour supply, but Dr. Watts pointed out that these difficulties were being met and overcome by the introduction of labour-saving tillage implements.

It was very important that the cultivation of cotton should be maintained on sugar estates in Antigua, since, owing to the prevalence of root disease of the sugar-cane, the introduction of the cotton crop into the rotation gave infected cane fields an opportunity of recovering from the disease.

In the past, some planters had shown a tendency to plant larger areas of cotton than they could properly supervise. The cotton crop was one which needed special care and attention, and in order to produce the best results, not more than 50 acres of cotton should be placed under the care of one man, who should be able to devote his whole time and attention to this area.

The importance of seed selection was then dwelt upon by the speaker, and it was mentioned that the Antigua Cotton Factory Company and others would supply suitable selected seed for planting at the same rates as in past years.

Planters who could give time and attention to the matter, however, were strongly advised to do their own seed selection, and to raise their crops from seed selected on the estate in the previous year.

Finally, Dr. Watts expressed the opinion that the kind of cotton which it was desirable to secure was a cotton of moderate length combined with strength; he believed it was better to sacrifice length than strength.

A vote of thanks to Dr. Watts for his address was carried unanimously at the close of the meeting.

CANADIAN EXHIBITIONS, 1908.

Barbados and St. Lucia Exhibits.

An editorial article that appeared in the *Agricultural News* of May 16 last (Vol. VII, p. 145) gave full particulars of the Canadian Exhibitions to be held in 1908, together with detailed information as to the steps that should be taken by Permanent Exhibition Committees and others in the West Indies in collecting, packing, and forwarding exhibits from these colonies.

Since the Toronto and Halifax Exhibitions for 1908 will be in progress at the same time, it will not be possible, as on previous occasions, for exhibits that have been on view at Toronto to be afterwards shown at Halifax, and therefore, since sufficient funds are not available for sending two sets of exhibits, the West Indies will this year be represented at Toronto only.

The Exhibition at Toronto opens on August 29, and closes on September 14.

As pointed out in the article referred to, the latest steamer that can take exhibits from the West Indies will be the 'Dahomé' leaving Barbados on July 26; St. Vincent, July 26; St. Lucia, July 27; Dominica, July 28; Montserrat, July 28; Antigua, July 29, and St. Kitt's on July 31. It may be worth while to mention, however, that the 'Ocamo', which leaves British Guiana on August 1, and is due at Halifax on August 20, will accept fresh fruit intended for exhibition from Dominica and other islands. The 'Ocamo' will call at the several islands, in each case twelve days later than the 'Dahomé,' e.g., it will be due at Dominica on August 9.

Recognizing the value of these exhibitions as a means of making the nature and quality of West Indian produce more widely known in Canada, the Permanent Exhibition Committee of Barbados despatched a large collection of samples of the products of the island to Toronto, by the C.L.S. 'Oruro,' on July 13. The samples sent included white, yellow, and dark crystal sugar; centrifugalled and ordinary muscovado sugar, syrup, 'Prime,' 'Fancy,' crystal sugar, and muscovado sugar molasses; rum, falernum, bitters, manjak, green tar, infusorial earth, Sea Island seed-cotton, cotton lint, and Circassian beans. The total number of exhibits sent from Barbados was eighty-six. A handbook of Barbados, issued in connexion with Canadian Exhibitions in previous years, has been brought up to date, and a new edition published for distribution to persons visiting the West Indian Court at Toronto. This contains a list of the exhibits sent, together with the names of the persons forwarding them.

The Agricultural Society of the island have undertaken the responsibility of collecting and despatching exhibits from St. Lucia, and the following is a list of the products which it is intended to forward: cacao (about 10 lb.), sugar (various grades of usine, 10 lb.), molasses, rum, molascuit, nutmegs and mace (1 quart of each), cassava starch and meal (2 quarts), copra, kola nuts, musk seeds, Cassia Fistula, a full assortment of guava and other native jellies and marmalades, logwood, pimento sticks, samples of native woods, honey and wax, oranges, Pere Louis and grafted mangos, limes and lime juice, and bananas.

DRY LAND CULTIVATION IN MADRAS.

In countries and districts where there is a limited rainfall, agricultural operations have to be carried out so as to ensure the conservation of soil moisture, and to reduce evaporation to a minimum. This question is dealt with, in special reference to the conditions prevailing in Madras, in an article in the *Agricultural Journal of India* (Vol. III, part 1).

The physical condition of the soil is an important factor in determining the amount of rain-water that will be absorbed, and it is of the greatest importance that the land should be in a fit state to receive and retain the rain when it comes. A hard-baked surface cannot absorb much water, therefore cultural operations should precede the rain.

The retention of soil moisture is greatly helped by surface cultivation, which provides a mulching of dry loose earth, and thus reduces the raising of moisture to the surface by capillary action, and its evaporation. Deep cultivation and a firm soil assist in keeping the soil particles together, and thus cause a more even distribution of moisture throughout the soil.

In the cultivation of the heavy lands in the dry districts of Madras, the soil is ploughed, to the depth of a foot or more, in the dry season. As the result of this operation, the earth is broken up into huge, dry clods, and left exposed to the air. After the first rains, the soil is broken down by a heavy bullock hoe, which produces a fine, firm condition of the land, and brings any larger clods to the surface, which are broken down by subsequent rains. Cotton is usually grown on land of the above type, and with the arrival of the second rain, the seed is sown by drill.

Frequent hoeings, both by draught implements and by hand, form the principal feature of the after-cultivation, the object being to remove all weeds, and so prevent the transpiration of moisture by their means, and to maintain the surface mulch of loose soil. These hoeings usually take place after rain has fallen, when the soil tends to cake on the surface.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

The *Agricultural News:* Price 1*d.* per number, post free 2*d.* Annual subscription payable to Agents, 2*s.* 2*d.* Post free, 4*s.* 4*d.*

Agricultural News

Vol. VII. SATURDAY, JULY 25, 1908. No. 163.

NOTES AND COMMENTS.

Contents of Present Issue.

The remunerative returns that may be obtained by judicious applications of manures to cacao plantations is evident from the results of experiments carried out at Dominica under the auspices of the Imperial Department of Agriculture, an account of which is given in the editorial of the present issue.

Molasses has long been used as a fertilizer for sugar-cane lands in Mauritius. Apart from the plant food constituents contained in the molasses, it is possible that this material influences the soil fertility by serving as a source of energy to the nitrogen-assimilating organisms present (page 227).

Brief articles on the pine-apple canning industry of the Hawaiian Islands, which has during the past few years undergone rapid development, and on West Indian Produce at the Colonial Fruit Show will be found on page 228, and on the following page appears a note, with illustrations, dealing with the comparative characteristics of spineless and ordinary limes.

It is satisfactory to note that the condition of the Sea Island cotton market is somewhat improved, and much more cotton has been sold. A Cotton Growers' Conference was held at Antigua, in which the condition and prospects of the industry in the island were discussed (page 225).

Samples of produce for the Toronto Exhibition have been forwarded from Barbados and St. Lucia (page 231).

Agricultural Conference Picture.

With this number of the *Agricultural News* is issued, as a loose supplement, a full-page reproduction of a photograph of the delegates to the West Indian Agricultural Conference, held at Barbados from January 14 to 21 last. The photograph was taken during the course of an ordinary sitting of the Conference at the Mutual Life Assurance Buildings, Bridgetown. Most of the delegates are included in the picture, but it is to be regretted that a few members of the Conference were absent from the room at the time, being engaged on Committee or other business. If desired, this illustration can be bound up with the complete volume of the *Agricultural News* at the end of the year.

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Dominica Limes.

The *Dominica Guardian* reports considerable shipments of green limes from the island. Nearly 4,000 barrels were exported early in June in one shipment: on June 14 the 'Korona' took 1,500 barrels of green limes for New York, and on June 2 another cargo of 3,200 barrels was despatched. At present the price of limes and lime products is distinctly low as compared with that prevailing a year ago, but the tendency is again evidently in an upward direction, and prices are higher than a month or two since.

On account of the drought that has been experienced at Dominica, the first lime crop will probably be a poor one, but with an improvement in the weather conditions, a good second crop may be expected. The success attained by the exhibits of Dominica limes at the Colonial Fruit show, held in London last month, was very gratifying, although, owing probably to the drought, the fruit was reported upon as being inferior in quality to that sent to the two previous shows.

The Permanent Exhibition Committee of the island have decided to be represented at the Toronto National Exhibition, and since they are confining their efforts to the organization of an exhibit of limes and lime products, a really fine display should be made.

◆

Tobacco Growing at St. Vincent.

Experiments in tobacco growing have for some years been carried out by Mr. Charles Duncan, of Sion Hill, St. Vincent, who has produced tobacco and cigars that have been awarded diplomas at various exhibitions within the colony. Since it is desirable that the possibilities of tobacco growing in the island should be given a careful trial, the Secretary of State, on the recommendation of the Imperial Commissioner of Agriculture, has approved of a grant of £15 being made to Mr. Duncan, to aid in these experiments, and more especially to assist towards the erection of a tobacco-curing house.

It is intended in the first instance to grow at least 1 acre of tobacco, and the curing-house, designed on the Jamaica model, is in course of erection. It has been arranged that the Superintendent of Agriculture, and other officers of the Agricultural Department shall visit the work from time to time, and keep in touch with its progress, and Mr. Duncan will also supply samples of the cured tobacco to the Agricultural Department.

Barbados Lemon Grass Oil.

A report has been received from London on samples of lemon grass oil prepared at the Government Laboratory, Barbados, from grass grown in the island.

The report, which is by the chief chemist to the London Essence Company, speaks very favourably of the oil, and the statement of analysis shows that the high citral content (88 per cent.) and freedom from resinous matter should enable the Barbados product to compete very favourably with oil from other sources.

The price of lemon grass oil for the past six months has been stationary at 2½*d.* per oz., which is rather low, the normal price being about 3*d.* per oz. In 1906 the price reached 9*d.* per oz. It is believed that notwithstanding present low prices, the production of this oil in suitable localities in the West Indies would prove remunerative.

Mineral Wealth of San Domingo.

The British Consul at San Domingo draws attention to the enormous mineral wealth which exists in the republic, but which under present conditions it is impossible to exploit, owing to the scarcity of labour and the absence of means of inland communication. Alluvial gold showing a high degree of purity is found in several districts, and veins of auriferous quartz exist all along the central mountain chain. Copper comes next in importance, on account of the large quantities in which it is known to occur in several provinces. Some mines that are being worked are said to yield the very high percentage of from 30 to 33 per cent. of pure copper. Iron is also found in immense quantities in different sections of the country, occurring both as magnetic oxide of iron and in the form of iron pyrites. Valuable deposits of coal both anthracite and lignite, have also been discovered. Other minerals known to exist in the republic include manganese, petroleum, mercury tin, and salt.

Orange Production in Palestine.

Orange cultivation is largely on the increase in Palestine, the headquarters of the industry being on the plain of Sharon, and producers are anxious to find an output for their fruit on the markets of Great Britain. The oranges grown are of the Jaffa variety and are reported as being of high quality. Ten years ago only 290,000 cases were exported; the total has now risen to 630,000 cases, and it is anticipated that within a very few years the output will reach 1,000,000 cases. Each case contains from 120 to 150 oranges, according to the size of the fruit: the weight of the case is 80 lb. Growers are at present in the habit of selling their fruit to agents at a price of about 2*s.* 4½*d.* per case: the cost of packing is estimated at about 1*s.* 2*d.*, and, taking into account the freight cost to Liverpool (1*s.* 3*d.* per case), it will be seen that anything obtained over and above 4*s.* 9½*d.* per case on the Liverpool market represents the agent's profit. The trees begin to yield at the end of the fifth year: in the sixth year it is estimated that the returns balance the expenditure, and thereafter profitable returns may be expected

The Alfoos Mango.

The London *Times* of June 19 last contained a note on the excellent qualities of the East Indian mango known as the 'Alfoos' or 'Alphonso.' This variety is stated to be so popular in Bombay that the fruits command a price of from 4*d.* to 6*d.* each in the open market. Attempts made to get this mango upon the English market in quantity have so far failed, owing to the decay of the fruit during shipment. During recent years grafts of the Alfoos mango have been imported into Florida, and the fruit growers of that State are reported to have given close attention to its cultivation, since it is recognized that on account of its high quality it would command the best prices. Producers claim that in a short time they will be able to export the fruit in quantity to the London market, and this may be possible, in view of the shorter voyage entailed as compared with that from Bombay.

Manila Hemp at Trinidad.

The fibre known as Manila hemp is produced from the plant *Musa textilis*, a native of the Philippines, and a near relative of the banana. Seeds and plants of *M. textilis* were a few years ago imported into Trinidad by the Botanic Department, and a plot is now growing at the St. Clair Gardens.

Samples of the fibre from these plants have recently been submitted to the Imperial Institute, London, for examination, and the report issued was published in the Trinidad *Official Gazette* of July 2. In this report, the fibre is described as well cleaned, white, and possessing a good lustre. Its strength was good, though not so great as that grown in the Philippines. The length of staple was 5 feet. The commercial value of the samples was placed at £30 per ton, with 'fair current' Manila hemp at £25 per ton, and it was remarked that fibre of the quality of the specimen would be saleable in any quantity.

Praedial Larceny at Jamaica.

A Bill dealing with praedial larceny in Jamaica is about to be introduced into the Legislative Council of the colony, and at a recent meeting of the Agricultural Society, the Governor gave some indication of the main provisions of this Bill. It is proposed that any persons found with agricultural produce, and who cannot give a satisfactory account of how it came into their possession, may be liable to arrest on suspicion, and the onus of proving their ownership to the article challenged rests on the suspected person. Further, it provides that, besides the police, other authorized persons, such as magistrates, district constables, persons nominated by branch Agricultural Societies, and others appointed as special constables shall have the right to arrest persons whom they have reason to suspect. It will be seen that the proposed enactments are very stringent in nature, but praedial larceny has largely increased in Jamaica of late, and demands drastic treatment.

INSECT NOTES.

Lepidoptera.

The order Lepidoptera includes those insects known as moths and butterflies, of which so many species exist in the West Indies. They may be distinguished from all other insects by the flattened scales which cover the surfaces of their wings. The arrangement of the scales, which is like that of shingles on the roof of a house, may be seen, in the case of the larger specimens, with the aid of a pocket lens, or magnifier. The Lepidoptera undergo complete metamorphosis, passing through all the stages of (1) egg, (2) larva or caterpillar, (3) pupa, cocoon, or chrysalis, and (4) imago or adult insect.

The mouth parts of the larvae of Lepidoptera are adapted for biting, while in the adult insects they are so modified as to form a proboscis or tube by means of which liquid food is sucked up. In many cases the adults of these insects do no feeding whatever, the whole of the food required throughout the life cycle being taken in by the caterpillar, in whose body is stored up a food reserve sufficient to provide energy for transformation through the pupal stage, and also for the processes of reproduction. In other species, however, the adults feed vigorously, sucking the nectar of flowers, and even puncturing ripe fruits to suck the juice, and sometimes becoming, in this way, the cause of a considerable amount of damage.

The popular division of the insects of this order into moths and butterflies is based on the structure of the antennae, or 'feelers.' In the butterflies the antennae are knobbed or club-shaped: that is, they are slender near the head, and at the end they are distinctly swollen. The butterflies, too, generally hold their wings vertically above the body when at rest, and the pupa is a 'chrysalis.' The moths have antennae of various shapes, but these are never distinctly knobbed; the wings are not held erect when at rest, and the pupa is generally enclosed in a cocoon of silk which, by the way, is often very scanty.

The order Lepidoptera includes some of the most troublesome pests attacking our crops. Among them may be mentioned the cotton worm (*Alabama* [Aletia] *argillacea*), the smaller cotton worm (*Aletia luridula*), the moth borer of the sugar-cane (*Diatraea saccharalis*), the corn ear worm (*Laphygma frugiperda*), the boll worm (*Heliothis obsoleta* [armigera]), the cutworm (*Prodenia ornithogalli*), the potato worm (*Protoparce cingulata*).

These all belong to the popular division known as moths, and to the moths also belong the following, which, however, do not attack crops directly: clothes moth, of which we have, perhaps, more than one species, grain moths, bee moths, etc.

The frangipanni hawk moth (*Pseudosphinx tetrio*) is a large grey and white moth which is sometimes attracted to the lights in houses. The larva of this moth, which feeds on the leaves of the frangipanni (*Plumeria*) and yellow bell flower (*Allamanda*), is perhaps the largest caterpillar in the Lesser Antilles, and is more abundant in some of the other colonies than in Barbados.

The larger moth borer (*Castnia licus*), a South American form that occurs as far north as Trinidad, is a very large insect; the larva is a borer in the stems of sugar-cane and bananas.

The arrowroot worm (*Calpodes ethlius*), at times becomes a pest from the severity of its attacks on arrowroot, and it is frequently a nuisance from its habit of attacking the leaves of canna.

For the most part, the butterflies are not such serious pests to agriculture as the moths. The arrowroot worm, however, should be included among the butterflies, and there is in British Guiana a butterfly (*Brassolis sophorae*), the larva of which attacks the leaves of the cocoa-nut palm; and in Dominica, Montserrat, St. Kitt's and Nevis, there occurs a butterfly which attacks ripe fruit. This latter species (*Didonia biblis*) is a South America form. The larva has not yet been reported to be a pest in these islands, but the butterfly feeds on ripe mangos, oranges, tangerines, etc., inserting the proboscis into the flesh of the fruit and sucking the juice. Any fruit punctured in this way falls to the ground, and several reports have been received of the loss of all the fruit on a tree in a very few days. *Didonia biblis* is a very pretty insect; the wings are glossy black, and on the outer margin of the hind pair there is a row of bright red spots.

The remedies to be used in the control of the Lepidoptera must of course be suited to their habits. The larvae of all the species of this group have biting mouth parts; consequently any arsenical poison (such as Paris green) would be efficient if it could be placed within the reach of the caterpillar while feeding. This method is followed in treating the cotton worm, and others which feed on the leaves of plants. In the case of those insects which have the boring habit, such as the moth borer of the sugar-cane, it is necessary to cut out the part with the insect in it; while in the case of cut worms, the poisoned bait, distributed so that it is easily found by the caterpillars, must be used.

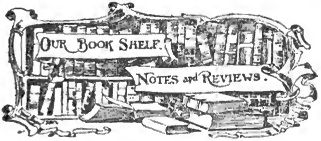
For the protection of ripe fruit from the attacks of the butterfly it would be necessary to cover the trees with mosquito net, or other light cover.

CACAO PRODUCTION IN BRAZIL.

Now that over-production has put a check on the coffee industry of Brazil, increasing attention is being given to cacao cultivation in the republic. Last year the production of this latter crop reached nearly 22,400 tons. The United States Consul at Rio Janeiro furnishes the following information:—

In spite of temporary set-backs now and then, due to special causes, the production of cacao in Brazil seems to be growing at a satisfactory rate, the increasing exports of the product forming one of the promising features of the Brazilian agricultural and trade situation. The Governor of the State of Para in his last message speaks of the industry as being in the most flourishing condition, and the immense increase in the world's demand seems to be greater than the increase in the world's production. At present Brazil leads in the world's production and the United States in the world's consumption.

The productive capacity of cacao in Brazil is almost limitless. In Para and Bahia the cultivation of the crop is being placed upon a scientific basis and it is probable that the next few seasons will show an immense increase in Brazil's output.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Notes and Reviews.

NATURE TEACHING. By Francis Watts, C.M.G., D.Sc., etc. *Issued under the Authority of the Commissioner of Agriculture for the West Indies.* Second Edition. Price 2s.

Recognizing the importance of training the younger generation in the West Indies to take an intelligent interest in agricultural pursuits and in a knowledge of the principles underlying the ordinary tillage and cultural operations, efforts were made, early in the history of the Imperial Department of Agriculture to encourage and facilitate the establishment of a system of agricultural teaching in the Elementary and Secondary schools of these colonies. In order to qualify elementary school teachers to give the right kind of instruction, courses of lectures on the subject, including practical demonstration work, were, in many islands, provided for them, while by the offer of scholarships and by provision for the services of lecturers, much has been done to extend agricultural teaching in the Secondary Schools of the West Indies. Further, in order that a thoroughly suitable text-book, well adapted to West Indian conditions, might be available to teachers, the first edition of Dr. Francis Watts' 'Nature Teaching' was prepared and issued in 1901.

Of late years it is gratifying to note that the teaching of Agricultural Science has been gaining in popularity among school managers and teachers in these colonies, and since in large numbers of cases the working of school gardens is being carried on in conjunction with the lessons given by the teacher, the practical side of the subject is kept well to the front. Under these circumstances the appearance of a revised and enlarged edition of 'Nature Teaching' (of which an English edition, modified to suit British conditions, was issued in 1903), should be especially welcomed.

The book extends to 240 pages, and is written in a very clear and interesting style throughout. The information given has been well selected, while its arrangement and presentation are such as to give the maximum amount of assistance to the teacher. In the course of the nine chapters into which the book is divided, the subjects of plant life and growth, the soil, its composition and the various conditions influencing its fertility, manures, insect life, etc., are treated at considerable length, and in a manner well calculated to arouse the interest of the pupils. The first section of the book deals with the seed, its parts, and conditions for germination, and this is followed by chapters which treat, in order, of the root and its uses; the stem and its structure, with illustrated descriptions of the methods of grafting and budding; leaves, their structure and uses, water in plants, the relation of plants to the atmosphere, and the food of plants; the soil, its composition, water in soils, etc.; manures and their use, nitrogenous manures, mineral manures, leguminous plants and nitrogen, etc.; flowers and fruits, uses of the different parts of a flower, insects and flowers, dispersal of seeds, variation in seedlings, etc.; weeds; and finally the last chapter deals with insect life, and gives an account of the life-history of one or two representative insects, with notes on general methods of treatment for those that are destructive to growing crops.

The importance of practical demonstration work in teaching agricultural science is kept well in view, and at the close of each chapter is given a series of exercises and experiments which illustrates the principles discussed. Some of the experiments described are such as can best be carried out in school garden plots, but when these are not available, it is shown that a good deal can be done by means of boxes and pots alone.

The book is illustrated, and at the close a glossary of the scientific terms employed, together with several appendices have been added. The latter deal with the habits of plants, classification of leaves, fruits, etc., and have been inserted in order to make the book as complete as possible for the purposes of reference.

There is no doubt that pupils who have been carefully guided through the course of work contained in Dr. Watts' book will not only have had their powers of observation developed and strengthened, and have learned to take an active and intelligent interest in plant and insect life, but they will also have gained a clear understanding of the various factors which influence the growth and health of agricultural crops, and acquired a fair amount of elementary scientific knowledge that may serve as a sound basis for future study.

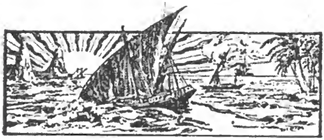
CACAO AT TRINIDAD.

The United States Consul at Trinidad has sent in the following report on the cacao crop of the colony during last season :—

The cacao crop of Trinidad for the year 1907 was a very full one. Official figures show an export of 41,038,204 lb., an increase over the previous year of 12,409,660 lb. These shipments were valued at approximately $8,900,000. Of this amount, however, the sum of $1,300,000 is to be credited to Venezuelan cacao, which was brought here in small boats from that country to be prepared and shipped to foreign markets. Of the 251,755 bags of cacao shipped from Trinidad, 114,749 went to New York; 134,611 to Europe (principally France); and 2,388 bags to Canada. Considering the high prices that the produce has realized, it is a very gratifying crop. For the month of January, 46,139 bags were exported, which is very nearly treble the output for January of the previous year.

The present outlook for a large crop during 1908 is encouraging. Considerable interest has been manifested here, in the past year, by both the government and the cacao planters in making a strong effort to eradicate the fungus diseases and insect pests affecting the cacao trees. The planters are giving more attention to the treatment of the soil, cover crops, shade, wind belts, pruning, etc., and endeavouring not only to maintain the high market position which Trinidad cacao has enjoyed for some years, but to improve it.

The *Demerara Argosy* in a lengthy editorial article draws attention to the increasing depletion of the accessible forest resources of the colony, as the result of indiscriminate and reckless tree felling by Indians and others. With the provision of transport facilities new sources of timber could be reached in the interior, but in the meantime, it is urged that more stringent regulations, controlling the felling of timber and the planting of young trees should be made, and enforced by the aid of officers appointed to carry them out



GLEANINGS.

A quantity of Castilloa rubber seed is now ready for distribution at the Dominica Botanic Station, and planters in the island can obtain supplies free on application.

Six hundred Para rubber plants (*Hevea brasiliensis*), growing in bamboo pots, are on sale at the Botanic Station, Dominica. Price 3*d*. per plant. Application should be made to Curator, Botanic Station.

The Tobago correspondent of the *West India Committee Circular* reports that several planters in the island are taking up tobacco culture in the hope of developing a profitable industry.

The shipment of bananas taken from Surinam by the Royal Dutch Mail Company's steamer 'Saramacca' on May 30 last, comprised 873 bunches of nine hands, 1,361 bunches of eight hands, and 1,397 of seven hands. (*Demerara Argosy.*)

Mr. J. H. Hart, F.L.S., retired from the post of Superintendent of the Botanical Department, Trinidad, on June 30 last, after twenty-two years' service in the colony. Mr. Frank Evans, who was Mr. Hart's chief assistant, has been appointed Acting Superintendent for the present.

The British Consul at Progreso, Mexico, reports that the exportation of logwood continues on a fair scale from Yucatan. The logwood is, however, more difficult to obtain than formerly, since the cuttings are further inland. During 1907 the quantity shipped from Yucatan reached 3,201,167 kilograms [1 kilo. = 2·2 lb.].

In Florida and other of the Southern States of America interest in mango growing has lately been stimulated by the introduction of fine flavoured varieties of the fruit from the East Indies. The 1907 report of the U.S. Secretary for Agriculture states that many landowners are planting out orchards of these lately introduced kinds.

Trials made in the past to grow leguminous green crops under cacao in Trinidad and Grenada, with the object of enriching the soil in nitrogen, have so far failed, since the plants did not flourish under the heavy shade of the cacao trees. It has been pointed out that this may possibly be due to lack of proper nitrogen-assimilating bacteria in the soil, and an effort is now being made by Mr. R. D. Anstead, B.A., Agricultural Superintendent of Grenada, to decide this question by carrying out experiments in growing cowpeas, which have been inoculated with suitable organisms, beneath the shade of the cacao trees.

In reference to the note on the plant *Musa Gilletii*, (a native of the Congo Free State), which appeared in the *Agricultural News* of June 27 last, it may be mentioned that a single plant of this species was raised at the St. Vincent Botanic Station, from the seed received from the Imperial Commissioner of Agriculture, and is now growing well in the grounds of the Agricultural School.

The fortnightly rice report dated July 10, of Messrs. Sandback, Parker, & Co., Georgetown, states that the light showers of rain that had lately fallen were most favourable to the young crop, which continues to look well, and good returns are anticipated. Shipments to the West Indian Islands during the fortnight ending July 10, amounted to 1,200 bags of rice.

The President of Venezuela has recently issued a decree prohibiting the cutting down of rubber trees in the districts of Rio Negro and El Caura. Rubber must be extracted by means of incisions. Balata trees may be cut down in certain seasons, provided two new trees are planted for each one destroyed, but the cutting of trees under eight years is forbidden, unless they are fully developed.

Experiments in cotton growing are in progress in Portuguese East Africa, and interesting results have been obtained. In one case, an acre of land on the Umbeluze river, about 20 miles from Lourenço Marques, yielded (nine months after planting) 463 lb. of cotton and 1,364 lb. of seed. The variety is not stated, but the lint, unpressed and somewhat discoloured, was sold in the United Kingdom at 7*d*. per lb.

The export of copra from Zanzibar in 1907 was not so large as in 1906, being 143,163 cwt. as compared with 157,445 cwt. in the previous year. The value, however—£137,633—was the highest on record. The price on the local market averaged 5*s*. 8*d*. per 35 lb. in January, and rose to 6s. 3*d*. in March. From that time there was a gradual decline to 4*s*. 3*d*. in December. (British *Consular Report.*)

The number of bales of cotton imported into the United Kingdom during the week ended May 21, 1908, was 16,110 (including 194 bales British West Indian and 774 bales British West African). The number imported from January 1 of the present year down to May 21 was 1,877,843 bales (including 5,737 bales British West Indian and 3,405 bales British West African).

Refreshing showers of rain fell at Barbados during the first and second weeks of July, and the cane crop, which was very backward as the result of the dry weather experienced in June, has considerably improved in appearance. More rain is sadly needed, however, or it would seem that only a short crop of sugar can be expected. Green fodder and provisions are at present scarce in the island and command high prices.

June was a very dry month in British Guiana, the average rainfall recorded being only 6·81 inches. This was less than half the fall that took place in May, viz., 16·33 inches. The shortage was fairly general throughout the three counties, the only stations at which much higher figures were recorded being Canal Polder, West Bank, Demerara, with 15 inches of rain, and Springlands and Skeldon in Berbice, with 11·19 and 10·24 inches respectively. For the six months ending June 30 last, the average total rainfall of British Guiana was 47·91 inches, while the fall for the corresponding six months of 1907 reached 88·63 parts.

THE PRINCIPAL FUNGUS DISEASES OF CACAO.

In continuation from the last issue of the *Agricultural News*, the latter portion of the leaflet dealing with fungus diseases of cacao, recently issued by the Imperial Department of Agriculture, is reprinted below:—

PINK DISEASE.

Occurrence.—The pink disease was first noticed in certain localities of Dominica, but it has subsequently been found on some estates in St. Lucia.

Symptoms.—The smaller branches of cacao trees frequently become covered with a pinkish incrustation. This spreads all over the surface of the bark, which eventually cracks and splits and peels off. Sometimes the fungus penetrates deeper into the tissues of the branch. Then the branches die.

Spread.—The fungus (*Corticium lilaco-fuscum*) that causes this disease is only noticeable in the rainy season, but the cracked bark showing where the branches have been attacked is easily recognized during the drier portion of the year.

Remedies.—This fungus may be destroyed by washing the affected branches with a lime-sulphur wash. This may be made by mixing 7½ lb. of slaked lime with 2½ lb. of flowers of sulphur, with 10 gallons of water, and boiling until the mixture turns orange in colour. This when cold should then be well rubbed on to the affected parts.

THREAD BLIGHTS.

Occurrence.—St. Lucia, Dominica, Trinidad, Tobago, and British Guiana.

Symptoms.—The fungi appear as sterile threads or strands of various colours, running irregularly up and down on the branches and stems, and closely adpressed to the bark. They generally spread upwards over all the younger twigs and buds, and then, not infrequently, pass to the leaves, and appear on their under surfaces in the form of a network of fine filaments. Small branches from these fungus threads penetrate through the bark into the deeper tissues—thus causing the death of the attacked portions of the trees. Similar branches penetrate into the interior of affected leaves and into the tissues of buds, and therefore leaves and buds may be killed out.

Remedies.—Thorough and constant pruning, and the burning of all diseased material appear to have kept these diseases in check in St. Lucia. They may still be found in damp, shaded portions of some estates, but can readily be kept from spreading. Applications of lime-sulphur wash to the fungal threads is also recommended, when heavy pruning cannot satisfactorily be done.

ROOT DISEASE.

Occurrence.—Dominica, Grenada, St. Lucia.

Symptoms.—Trees affected with root disease present a sickly appearance. The leaves are small and of a yellowish hue. The branches begin to die from the tips, the leaves wilting and frequently hanging for some time on them.

If the roots of a diseased tree are laid bare it will be seen that many of the roots look black and are dead. If the bark is peeled off from these roots, a white web of fungus threads will be found between the bark and the wood. This is a typical sign of the disease. It is always to be observed in the larger diseased roots, but cannot always be noticed in the younger ones. When the fungus has invaded all the roots, or has circled the stem just below the level of the ground, the tree dies.

Spread.—The fungus that causes this disease is known to attack other plants, such as pois-doux, bread-fruit, bread nut, avocado pear, etc., and not infrequently has an attack of cacao trees been traced by the spread of the fungus underground from one of these trees that has died or is dying.

Remedies.—All dead pois-doux, bread-fruit, cacao trees etc., should be removed, and their roots extracted and burned. When an area of cacao is observed to be affected, it should be isolated from the remainder of the field by digging a trench about 2 feet deep and 18 inches wide around it—care being taken to include everyone of the unhealthy trees in this circumscribed area and to throw the earth from the trench into the part cut off. This encircling trench should be connected with the drainage system.

All the trees in this affected area must now be examined carefully. The most badly diseased ones should be taken out and burned—roots and everything; others less badly affected should have their roots laid bare and the soil removed as far as possible. The diseased roots should be cut off and the diseased portions removed from the soil. A good application of lime should then be given in the hole that has been made around the tree, while laying bare the roots.

The whole of the affected circle should then be thoroughly forked and a good application of quick lime at the rate of about 10 lb. per tree should be broadcasted. After a time applications of pen manure and mulchings should be given, and in the following year another application of lime at the rate of about 3 to 4 lb. per tree should be made. After the first general thorough forking of the affected circle, it is advisable that further forking should not be given for some years unless the trees are falling back, the land being kept in good tilth by heavy mulchings. Forking always causes wounds to the roots, and if the fungus is present in the soil, this operation is the means of spreading the disease.

BROWN POD.

Occurrence.—In all cacao-producing districts.

Symptoms.—It commences as a brown, almost circular spot, usually at either end of the pods or along one of the grooves on the cacao pods. The decay spreads rapidly throughout the whole pod, its surface becoming brownish-black in colour all over. The pod is usually soft and rotten, and all the beans are destroyed.

Spread.—This disease is caused by *Diplodia cacaoicola*, and spreads by means of spores that break through the surface of badly diseased pods.

Remedies.—This disease may readily be kept in check by collecting all diseased pods and, together with all husks and shells, burying them with lime in trenches or pits. An epidemic of this disease could be checked by spraying all the pods on the trees of a plantation with Bordeaux mixture, after the diseased ones have been removed.

BLACK POD.

Symptoms.—The attacked pods turn black and are subsequently covered with the white mycelium of the fungus, from which are given off large numbers of spores. These are carried by wind and rain to other pods, which they quickly attack.

Remedies.—The fungus that causes this disease is *Phytophthora omnivora*. The same remedies as recommended for brown pod should be applied. These have proved to be quite effective. A reduction in shade might be practised in some localities, for too moist and shaded an atmosphere favours the growth of the fungus.

SCIENCE NOTES.

A Toxic Substance Excreted by the Roots of Plants.

A short note giving descriptions of investigations into a toxic substance excreted by the roots of a variety of plants has recently been published by Mr. F. Fletcher, M.A., B.Sc., Deputy Director of Agriculture, Bombay, as No. 3 of Vol. II, Botanical Series, of the *Memoirs* of the Department of Agriculture in India.

It has frequently been suggested that plants excrete (from their roots) some material that is no longer of use to them or that are by-products of the process of metabolism. Further it has been held that it is possible that such substances may be injurious to the kinds of vegetation by which they are excreted.

Observations made by Mr. Fletcher some years ago (while in Egypt) lead to the conclusion that certain phenomena shown by crops growing in the field could only be explained by the theory of excretion. This was especially the case with cotton crops in which a grass was allowed to grow as a weed. Poor crops were often observed, and experiments showed that neither lack of water or manures, nor faulty aeration was the cause of the poor growth.

Observations in the field were subsequently resumed in India, and these tended very materially to strengthen the view that substances injurious to other plants were excreted by the roots of certain common crops. This was especially the case with sorghum.

Plots of various crops were grown side by side at the Surat Experiment Station, each plot being sown by means of a drill in such a way that the rows were 2 feet apart, and were parallel in all the plots. Further, several plots were left fallow, as it was found that plants growing on the border of a fallow gave a return ten times as great as that yielded by others in the centre of the plot. Also, cotton and sorghum were sown in alternate rows in the same plot.

Observations were then made on the following points:—

(1) The yield of the row of each crop bordering on fallow.

(2) The yield of the row of each crop bordering on a plot bearing another crop.

(3) The yield of a row of each crop in the centre of a plot bearing only that crop.

(4) The yield of a row of cotton when grown with a row of sorghum on each side (at a distance of 2 feet).

(5) The yield of the row of sorghum when grown with a row of cotton on each side (at a distance of 2 feet).

Under the particular conditions of soil and climate under which the experiments were conducted, the following conclusions were arrived at, as the result of these observations:—

(1) All plants excrete substances which are toxic both to themselves and to other species.

(2) The quantity of material excreted by the different crops varies when reckoned per unit area of a field sown in the ordinary way.

(3) The sensitiveness of crops to the same quantity of the excreted substance varies with the variety of the crop.

(4) The substance excreted by all crops is probably identical.

In the experiment where cotton and sorghum were grown in alternate rows, very interesting results were obtained. The experiments were made on ¼ acre plots, on land, the crop and manurial record of which had been known for the previous nine years. The sorghum yielded much better after cotton than after sorghum and the converse also appeared to be the case; that is, cotton yielded less after cotton than after sorghum, so that the whole results obtained would appear to be an example of the benefits of rotation.

A large number of water cultures with different plants were carried out at the Dharwar Experiment Station, and solutions of the excreta from their roots were obtained. Seedlings placed with their roots in these solutions soon withered, and the data given show that all the plants under experiment withered in the same order in the different solutions. All did worst in the excretory solution from *Cicer arietinum*, followed in order by sesamum (*Sesamum indicum*), wheat, cotton, cajanus, and sorghum. The fact of this regularity appears to favour the view put forward that the substances excreted by various plants are identical, and that the solutions used differ only in concentration and not in kind.

Preliminary chemical tests of the toxic substance excreted by the plants have been made and tend to prove that it is an alkaloid, and that the substances excreted by different crops are apparently identical. The absence of sufficient literature for reference has rendered it, as yet, impossible to compare its reactions with those obtained with any of the known alkaloids. The amount of substance given out by the roots is not inconsiderable.

The toxic substance is precipitated by most of the mineral manures in common use. This suggests the manner in which many manures may possibly act towards increasing crop yields, and indicates that the supply of so many units of some fertilizing substance may not be the last word in correctly interpreting the effects of manures. Further, the precipitation of the substance by tannic acid raises many interesting points in connexion with the manurial value of leaves of different varieties of trees both as manure and as mulch. In this connexion, the author of this note states that in spice gardens and rice fields in Canara, leaves (containing tannic acid) are systematically used as manure, and that the cultivator's opinion as to the manurial value of the leaves of any variety of tree appeared to correspond with the amount of tannic acid which analysis showed to be contained in these leaves. That it is not the ash constituents of these leaves which produce the manurial effect is obvious from the fact that if the leaves be burnt and the ashes applied to peppers—one of the spices to which the leaf manure is applied—the pepper plants are killed. Similarly, neither irrigation nor farmyard manure serves the purpose of the leaves. The latter, therefore, serve neither for the storage and regulation of water nor as a supply of nitrogen.

The isolation of this toxic substance in solution, and the experimental proof of its presence and effects in the case of a large number of plants, are of considerable interest, and constitute another advance in scientific agriculture. Further experiments with other plants, and in different parts of the world will be looked for with interest. The effect of the result of this inquiry on the question of rotation of crops is obvious. Each crop, through the excretion of this toxic substance, fouls the soil for a crop of the same variety, whose roots will occupy the same layer of soil as the previous crop more than for a crop whose roots spread in another layer.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of May:—

The condition of the market throughout the month of May was characterized by its general dullness, and though a month had elapsed since the previous drug sale the demands at the first drug auction on May 7 were exceedingly slow and without interest. In the matter of products affecting the West Indies the following are the chief items:—

GINGER.

At the first auction of the month Jamaica was not represented, but some 300 bags of new crop Cochin and Calicut were offered and bought in. In the following week, however, a very large offering of Jamaica was made, amounting to 1,180 packages, of which 350 were disposed of at the sale and afterwards, at steady rates, common fetching from 55*s.* to 56*s.* and good ordinary to middling 60*s.* 6*d.* to 67*s.* Fair medium to bold plump washed Cochin realized at the same sale 37*s.* Some African was also offered and bought in at 25*s.* to 26*s.* per cwt. On the 20th, Jamaica was again brought forward in large quantity, some 700 packages being offered. The demand, however, was slow, but at the auction and afterwards some 500 packages were disposed of at the following rates: good 76*s.* to 80*s.*, fair to good common, 56*s.* to 62*s.* 6*d.*, and common 51*s.* These prices were a general decline of from 1*s.* to 2*s.* on previous rates. There was a fair supply of Cochin and Calicut at this sale, but only 80 bags were disposed of; rough Calicut fetched 34*s.*, and washed Cochin was bought in at from 37*s.* to 38*s.* Jamaica was again in good supply at the last sale on the 27th, over 900 packages being brought forward, 600 of which found buyers at the sale and afterwards. The quotations were—good to fine washed from 80*s.* to 87*s.*, bold 72*s.*, dull washed 62*s.* to 65*s.*, small to good common 54*s.* to 60*s.*, and very common 51*s.* to 52*s.*

NUTMEGS, MACE, AND PIMENTO.

At the first spice sale some 299 packages of nutmegs were offered and disposed of at irregular rates. A week later 125 packages of West Indian were offered and about 100 sold at steady rates. No quotations were made later. About 72 packages of West Indian mace were brought forward at the first spice auction and disposed of at the following rates:—1*s.* 4*d.* to 1*s.* 5*d.* for good pale and reddish, 1*s.* 2*d.* to 1*s.* 4*d.* for fair to good red, and 10*d.* to 1*s.* 3*d.* for ordinary broken to good pale. Very slight changes occurred in these prices at later periods of the month. Pimento at the first auction was very slow of sale: 183 bags were offered and all were bought in at 2¼*d.* to 2⅜*d.* per lb. On the 20th, 510 bags were offered and 300 sold, barely fair to fair fetching 2⅛*d.* to 2¼*d.* At the last sale, 235 bags were offered and all bought in at from 2¼*d.* to 2½*d.* per lb.

ARROWROOT.

At the beginning of the month there was no demand for this article, the whole of the offerings at the first sale being bought in. At the second auction on the 13th, 98 barrels of St. Vincent were sold without reserve at from 1⅝*d.* to 2*d.* for ordinary to fair manufacturing. A week later there was a slight advance in prices, 38 barrels being sold out of 70 offered, at 1¾*d.* to 2⅛*d.* for the same quality. About 20 boxes of good Natal were also offered at this sale and bought in at 4½*d.* per lb. The latest quotations for the month for ordinary to fair manufacturing St. Vincent were 2*d.* to 2¼*d.* per lb.

SARSAPARILLA.

Prices of this drug have remained steady throughout the month for nearly all descriptions. Grey Jamaica still remains exceedingly scarce. At the first drug sale on the 7th, 20 packages of grey Jamaica were offered and all were sold; 13 bales fetched 2*s.* to 2*s.* 1*d.* per lb. One shilling and seven pence to 2*s.* was paid for water-damaged. Ten bales of native Jamaica fetched 1*s.* 1*d.* to 1*s.* 2*d.* per lb. for fair red, 1*s.* for ordinary yellow, and 9*d.* for sea-damaged. Some bales of pale yellow to dull red sold at 1*s.* to 1*s.* 1*d.*

KOLA, TAMARINDS, LIME JUICE, ETC.

Eighty packages of kola were offered at the first sale, and 52 sold. They consisted of West African from St. Thomé, which sold at 1½*d.* per lb. Fair dried West Indian and Ceylon realized from 1½*d.* to 1¾ per lb. Tamarinds have appeared during the month from both India and the West Indies. At the first sale, 32 barrels of new crop Barbados were sold at 15*s.* per cwt. in bond, another 6 barrels of Nevis being also disposed of at the same price. The following week, 5 casks of fair Calcutta were also sold without reserve at 11*s.* 6*d.* per cwt., and at the last sale 44 packages of Barbados were disposed of at 13*s.* to 14*s.* per cwt. in bond. Of lime juice, 3 hogsheads of good pale raw West Indian were offered at the first auction and realized 1*s.* 2*d.* per gallon, while for 7 puncheons of similar quality 1*s.* 3*d.* was paid. Two cases of West Indian distilled oil of lime were sold at the first auction at 1*s.* 10*d.* per lb. At the close of the month 1*s.* 10*d.* to 2*s* were the quotations for this quality oil of lime. West Indian distilled orange oil, of which 1 case was offered at the beginning of the month, fetched 5*s.* per lb. A large quantity of cashew nuts, the source of which was not stated, were offered about the middle of the month and 5 bags described as 'husky' were sold without reserve at 24*s.* per cwt.

SCHOOL GARDENS AT BARBADOS.

The latest report (1907) of the Inspectors of Elementary Schools, Barbados, contains the following reference to school garden work in the colony:—

We have made little progress under the head of Agricultural Instruction, and we are not likely to make much until the Legislature allots a special grant for the subject. We have, however, not retrograded. About the same number of schools took up the subject as in the year before, and the number of passes is about the same. Some of the school gardens that were less satisfactory than others have been given up, but the work in the better gardens has improved. At the Applewhaite's local show in December last, the exhibits numbered 122, and were distinctly better than at any previous show. There is a great difficulty in obtaining land for school gardens in this island, and even sites for school buildings cannot easily be procured.

Our opinion is that model school gardens might be started in suitable localities where the pupils from neighbouring schools would receive instruction on one afternoon in every week. If their work could be supervised by an officer connected with the Imperial Department of Agriculture success would be assured. This plan has been adopted in British Guiana, and the cost is defrayed by the Government, while the gardens are under the control of the Department of Science and Agriculture.

MARKET REPORTS.

London,—July 7, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., July 7, 1908.

Arrowroot—2½d. per lb.
Balata—Sheet, 2/- to 2/4; block, no quotations.
Bees'-wax—Good quality, £7 17s. 6d. to £8 per cwt.
Cacao—Trinidad, 63/- to 75/- per cwt.; Grenada, 54/- to 58/- per cwt.
Coffee—Santos, 29s. per cwt.; Jamaica, no quotations.
Copra—West Indian, £17 per ton.
Cotton—St. Vincent, 14d. to 15d.; Barbados, 14d. to 15d.; St. Kitt's, 14d. to 15d.; Montserrat, 14d. to 15d. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—Unsaleable.
  Pine-apples—St. Michael, 2/3 to 4/- each.
  Grape Fruit—12/- to 14/- per box.
  Oranges—Jamaica, 11/- to 12/- per box.
Fustic—£3 10s. to £4 10s. per ton.
Ginger—Quiet.
Honey—20s. to 32s. per cwt.
Isinglass—West India lump, 1/6 to 2/1 per lb.; cake, no quotations.
Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £13 10s. per cask of 108 gallons; Distilled oil, 2/1 to 2.2 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10s. to £4 5s. per ton; roots, no quotations.
Mace—Quiet; no quotations.
Nutmegs—Quiet.
Pimento—Quiet; 2½d. to 2¾d.
Rum—Jamaica, 3/- to 8/-; Demerara, 1/6 to 1/7½ per gallon; Trinidad, no quotations.
Sugar—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 16/2½; Molasses, 14/- to 14/6.

New York,—June 26, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 13c. to 14½c.; Grenada, 12½c. to 13¾c.; Trinidad, 12¾c. to 14c.; Jamaica, 11c. to 13c. per lb.
Cocoa-nuts—Jamaica, select, $23·00; culls., $14·50; Trinidad, $22·00; culls, $14·00 per M.
Coffee—Jamaica, good washed, 9c. to 11c.; good ordinary, 7¾c. to 8¼c.
Ginger—10¾c. to 14c. per lb.
Goat Skins—Jamaica, 50c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c., dry flint, per lb.
Grape Fruit—Jamaicas, $3·00 to $4·50 per box and $5·00 to $8·00 per barrel.
Limes—Dominica, $6·50 per barrel.
Mace—19c. to 31c. per lb.
Nutmegs—110's, 9c. per lb.
Oranges—Jamaica, $1·70 to $3·00 per barrel.
Pimento—4¼c. per lb.
Sugar—Centrifugals, 96°, 4·40c.; Muscovados, 89°, 3·90c.; Molasses, 89°, 3·65c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. Leacock & Co., July 20, 1908; Messrs. T. S. Garraway & Co., July 21, 1908.

Arrowroot—St. Vincent, $4·00 to $4·10 per 100 lb.
Cacao—Dominica, $14·00 to $15·00 per 100 lb.
Cocoa-nuts—$16·00 per M. for husked nuts.
Coffee—Jamaica, $8·50 to $9·00 per 100 lb.
Hay—$1·65 per 100 lb.
Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $48·00; Sulphate of ammonia, $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·00 to $2·25 per 100 lb.
Potatos, English—$3·00 per 160 lb.
Peas—Split, $6·60; Canada, $3·25 per bag.
Rice—Demerara, $5·90 (180 lb.); Patna, $3·80; Rangoon, $3·00 per 100 lb.
Sugar—Muscovado, 89°, $2·05 per 100 lb., package included; Dark crystals, $2·50; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—Georgetown Chamber of Commerce Fortnightly market Report, July 10, 1908.

Arrowroot—St. Vincent, $9·50 per barrel.
Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.
Cacao—Native, 13c. to 18c. per lb.
Cassava—80c.
Cassava Starch—$9·00 per barrel of 196 lb.
Cocoa-nuts—$16·00 per M.
Coffee—Creole, 12c. to 13c.; Jamaica, 12c. per lb.
Dhal—$6·00 per bag of 168 lb.
Eddos—80c. per barrel.
Molasses—Yellow, 23½c.; Dark, no quotations.
Onions—Madeira, 2½c.; Lisbon, 2½c. to 3c.; Dutch, 3c. per lb.
Plantains—36c. to 60c. per bunch.
Potatos,—English, $2·60 to $2·75 per barrel.
Potatos, Sweet—Barbados, $1·68 per bag.
Rice—Ballam, $6·40; Creole, $5·60 to $5·75 for good; Seeta, $6·00 per bag.
Split Peas—$6·25 per bag (210 lb.); Lisbon, $4·50.
Tannias—$1·44 per bag.
Yams—White, $2·16; Buck, $4·60 per bag.
Sugar—Dark crystals, $2·75; Yellow, $3·50; White, $3·80 to $4·00; Molasses, $2·25 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·50 to $5·50 per M.
———**Cordwood**—$2·40 to $2·64 per ton.

Trinidad,—July 11, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$11·75 to $13·00 per fanega.
Cocoa-nuts—$20·00 per M., f.o.b.
Cocoa-nut Oil—58c. per Imperial gallon, cask included.
Coffee—Venezuelan, no quotations.
Copra—$2·50 to $2·75 per 100 lb.
Dhal—$4·90 to $5·00 per 2-bushel bag.
Onions—$1·75 to $1·80 per 100 lb. (retail).
Potatos, English—$1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·65; White, $4·90 to $5·75 per bag.
Split Peas—$5·85 to $6·00 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

A FORTNIGHTLY REVIEW
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Poultry Keeping in the West Indies.

POULTRY keeping is an industry carried on by agriculturists in all parts of the world, and one which should possess good possibilities of profit in rural districts in the tropics, where, since it is not always possible to obtain a daily supply of fresh meat, the poultry yard has to be relied upon to supply a considerable proportion of the animal food required by all classes of the community.

The profitable nature of poultry raising depends very much upon the amount of care and attention which the birds receive, and for this reason the most satisfactory results are usually obtained by agriculturists on a small scale, who possess or rent no more than a few acres of land, and carry out themselves all the details of work connected with the management of their holding. Thus it is seen that the poultry industry is most prominent in those countries where small holders predominate, i.e., in France, Denmark, Italy, and latterly in Ireland.

Fowls are kept very generally by people of all classes in the West Indies, although it cannot be said that much systematic attention is given to their breeding and management. A flock frequently consists of mongrel birds, of inferior utilitarian character, which are allowed to stray where they will, and pick up food where they can. Hens are often kept after they have reached an age when they are no longer profitable layers, and nothing is done to prevent repeated in-breeding.

Bearing these facts in mind, the Imperial Department of Agriculture has in the past made considerable efforts to improve local breeds of poultry. To this end in many of the West Indian Islands birds of improved breed have been imported and eggs from them distributed. With the object of providing further assistance to poultry raisers, a pamphlet (No. 23) entitled 'Notes on Poultry in the West Indies,' was in 1903 issued by the Department. This pamphlet, which was prepared by Mr. John Barclay of Jamaica, who has had considerable personal experience in connexion with the subject, contains full and practical details in regard to the selection, rearing, and feeding of poultry and the treatment of diseases, exactly suited to West Indian conditions.

The number of breeds of poultry is legion, and since the great majority of these originated in temperate climates, where they naturally flourish best, a considerable amount of discrimination is necessary to select those breeds which shall be most satisfactory in the tropics. The different varieties may be divided into (1) table breeds, (2) laying breeds, and (3) 'general purpose' fowls. For table purposes the Indian Game, the Dorking, and the English Game stand pre-eminent among breeds, being large and fleshy, and with meat of excellent quality. At shows of table poultry in England, the chief prizes are usually awarded to birds which are the product of a cross between the Dorking and one of the Game breeds. In Jamaica the Indian Game is a favourite bird among pen-keepers, and it is pointed out by Mr. Barclay that it is more suitable to the climate than any other breed of table bird. The Dorking is suitable for dry localities in the West Indies where there is plenty of shade and a good run, but the birds have not been so successful in Jamaica as the Game breeds. The hens of the three breeds mentioned are all poor layers but good sitters.

As laying breeds the Leghorns and Minorcas are undoubtedly the best, and the former is probably the most profitable variety of hen that can be kept in the West Indies. It is hardy, active, a good forager, and possesses the record for number of eggs laid by any breed. The Leghorn, too, appears to thrive equally well both in wet and exposed localities, and also in hot as in dry districts, in confinement and at large. Minorcas are also excellent layers of large eggs. They thrive in warm sheltered places and give very profitable returns, but will not stand exposure so well as the Leghorns. The Buff Orpington is another breed possessing good laying properties, and the birds have lately gained much in favour in the West Indies.

Of the general purpose or 'all-round' breeds of fowls, the best known and most satisfactory are the Plymouth Rock, the Buff Orpington, and the Wyandotte. The Buff Orpington is an excellent table fowl, and, as mentioned above, yields a good number of eggs. The Plymouth Rock and Wyandotte originated in the United States, where they were produced by crossing heavy Asiatic table breeds with the smaller laying breeds, and by careful selection of the most suitable among the offspring. They are good general utility fowls, the hens are satisfactory layers, good sitters, and make excellent mothers.

The most economical method of feeding hens is a subject deserving a good deal of consideration. In the West Indies the birds are fed almost entirely on maize, which is cheap and abundant, and provided the hens get plenty of liberty, and are not fed too heavily, this substance is fairly satisfactory. Like most West Indian grown poultry foods (rice, Guinea corn, yams, sweet potatos, tannias), however, maize possesses an excess of starch, and is deficient in nitrogenous (or flesh-forming) constituents. A common result of feeding too much maize or other starchy food is that the birds become over-fat and numbers die from apoplexy or other diseases, brought on by this condition. By the addition of a certain proportion of pigeon or other peas, cocoa-nut, or meat scraps, to the maize, the provision of the necessary nitrogenous constituents is ensured, and such a complete or 'balanced' food meets all the requirements of the animal organism. Soft food such as a mixture of various meals, should be given to fowls in the morning, and hard food, as a mixture of corn and pigeon-peas (the latter roughly ground or broken), be fed in the evening. The proportion of corn to peas should be two parts of the former to one of the latter.

SUGAR INDUSTRY.

Sugar Industry in the Hawaiian Islands.

The Sugar Planters' Association of Hawaii reports that the 1907 sugar crop of the Hawaiian Islands amounted to 440,017 short tons (1 short ton = 2,000 lb.), which is the largest on record. Of this quantity the island of Hawaii produced 143.891 tons, Oahu 119,273 tons, Maui 104 772 tons, and Kauai 72,081 tons.

The exports of raw sugar in 1907 show a large increase both in quantity and value over the shipments of 1906. In 1906 the total quantity exported was 318.108 tons, valued at £4,768,161, whereas, in 1907, the raw sugar exports from Hawaii reached the total of 359,039 tons, valued at £5,372,000, an increase of 40,931 tons in quantity and £603,839 in value. With the exception of a small quantity dealt with in mills on the islands, the whole of the sugar produced is shipped to San Francisco for refining.

The exports of refined sugar from Hawaii show a decline during last year. In 1906 the value of the refined sugar exported amounted to £330,925, but in 1907 it dropped to £166,599.

The sugar industry has developed very rapidly in the Hawaiian Islands during the past twenty-five years. In

1882 the crop is reported to have been 57,000 short tons, while the possible output of the islands was estimated at about 84,000 short tons, or less than one-fifth of the crop yield of the past year.

The sugar planters of Hawaii have formed an association, which at its own expense maintains an Experiment Station, with a staff of scientific officers. A valuable series of experiments, designed to assist the sugar industry, is in progress at the station. These include trials of seedling and other varieties of cane, manurial experiments, the breeding of parasites to control such pests as the cane borer and cane-leaf hopper, and the investigation of fungus diseases affecting the plants.

Varieties of Cane Planted at Antigua and St. Kitt's.

The first part of the report on the Sugar-cane Experiments carried out in the Leeward Islands during 1906-7 contains an appendix dealing with the present position as regards the planting of new varieties of sugar-cane at Antigua and St. Kitt's.

In Antigua, prior to 1895, practically only the Bourbon cane was grown. By that year the serious ravages of cane diseases, principally rind fungus (*Trichosphaeria sacchari*), necessitated search for varieties of cane of greater disease-resisting character, and as a result the Bourbon was almost entirely replaced by the White Transparent. Since the latter became the standard cane in Antigua, the experimental introduction of newer and improved varieties of sugar-cane has still continued, and a considerable area in the island is now planted with seedling canes.

A tabular statement is given in the appendix mentioned, which shows the acreages planted with different varieties of canes on sixty-four estates in Antigua for the crops of 1907 and 1908, while as regards the crop of 1908, returns are also provided from eleven additional estates, the total seventy-five estates practically comprising the whole island

In the crop of 1907, on sixty-four estates, there were 8,879½ acres reaped. Of this area 6,787 acres were White Transparent and 190 acres only of Bourbon. There were, therefore, 1,902½ acres of other varieties, or 21·4 per cent. of the area of these sixty-four estates. On the same estates for the crop of 1908, there were reaped 8,611½ acres of canes. Of these 6,345½ acres were White Transparent and 138 acres Bourbon. The new varieties, therefore, occupy 2,128¾ acres, or 24·1 per cent. The reduction of 268 acres in the acreage planted in 1908 on the above estates as compared with the acreage of 1907 is, it is stated, probably traceable to labour difficulties.

Taking into account the eleven additional estates above mentioned, this gives the total planted area on the seventy-five estates for the crop of 1908, as 9,811 acres of land. Of this, 7,092½ acres are planted in White Transparent canes and 140 acres in Bourbon. There are, therefore, 2,578½ acres planted in new varieties, or 26·2 per cent. of the total planting. The new canes most generally planted at Antigua are B.147, Sealy Seedling, B.208, and D.95. The areas planted with canes B.109 and B.306 are being decreased, since it is stated that both these canes come under suspicion as regards their freedom from disease.

Reliable records of field results on a large scale with different varieties of cane on Antigua estates are not easy to obtain, but some particulars that have been collected are included in the appendix referred to. The figures given show that D.95 has given very satisfactory results on several estates, the yields of cane recorded ranging from 31·3 tons to 42 tons per acre. The few returns obtainable relating to B.147 show that it yielded from 19·3 to 29·2 tons as plant canes, and 19·6 tons as ratoons; in two cases recorded B.208 has given 26·3 and 29·4 tons per acre respectively, Sealy Seedling from 18·4 to 25·2 tons, while in regard to White Transparent, for which a much larger number of returns were obtainable, yields of from 20 to 35·2 tons per acre are recorded.

A return has also been compiled, and i sincluded in the report, giving the areas under each variety of cane on forty-three estates at St. Kitt's, representing practically the entire area at present under cultivation in that island, and comprising 7,506 acres. The White Transparent cane is planted on 2,171 acres, while the area planted with Bourbon cane is no more than 21 acres. There are, therefore, no less than 5,314 acres, or 71 per cent. of the whole, under cultivation with new varieties of sugar-cane at St. Kitt's.

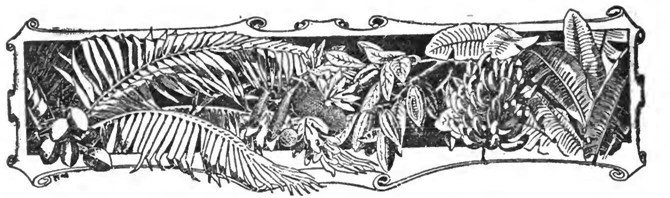
The relatively larger proportion of the total area at St. Kitt's that is planted with seedling canes, as compared with Antigua, is noticeable. It is explained that the Jamaica variety of the White Transparent cane introduced into St. Kitt's ten years ago with the object of replacing the disease stricken Bourbon, did not show the same immunity to disease in the island which it had shown elsewhere. It was therefore at once necessary to find some other and more disease-resistant cane, and the one which appeared best to meet the needs of the St. Kitt's planters was the seedling B. 147. For several years, therefore, B. 147 and the White Transparent have been the two chief varieties planted in the island, and the areas occupied by these two canes for the crop of 1908 were 2,708 and 2,171 acres respectively.

B. 208 also is now largely planted at St. Kitt's, no less than 2,101 acres being under cultivation with this cane for the crop of 1908. The results of the sugar-cane experiments conducted by the Imperial Department of Agriculture show that B. 208 is admirably suited to the soil and climatic conditions which exist at St. Kitt's. Sea Island cotton is grown at St Kitt's as a catch crop between two cane crops, and it is desirable, for the successful working of this system of cultivation, that the variety of cane grown should possess a short cycle of growth, and mature early. In these respects B. 208 is superior to B. 147, and it is pointed out that the introduction of cotton cultivation into the island has therefore probably had an influence in extending the area planted with the cane B. 208.

Sugar-refining Industry in Japan.

The sugar-refining industry showed signs of rapid development in Japan some three or four years ago, and in 1906 the value of the refined sugar exported to China and Corea exceeded £1,000,000 sterling. In 1907, however, owing to strong competition by factories at Hong-Kong, the value of the sugar exported from Japan to China fell to £172,000.

The latest British *Consular Report* on the trade of Japan, however, speaks of the sugar industry of the country as a highly promising one, provided it gets a fair chance of development. The raw sugar for the refining factories is at present imported chiefly from Java, the Philippine Islands, and Germany, but it is hoped that in time Formosa will be able to supply Japan's requirements for this commodity. In 1906 Formosa produced 77,000 tons of raw sugar: in 1907 the weather was unfavourable, and the output was little more than 62,000 tons.



WEST INDIAN FRUIT.

BANANA INDUSTRY IN THE CANARY ISLANDS.

Official returns relating to the exports of bananas from the Canary Islands during the past year show that there has been a slight falling off in the shipments as compared with 1906. The number of crates exported in 1907 were 2,391,297, as compared with 2,476,044 in the previous year. This decline does not however, indicate that there is any permanent decrease in production.

It is reported by the British Consul at the Canaries that the quality of the bananas from those islands has lately shown signs of degeneration, and this is stated to be due to the number of years that the land has been under the same cultivation, and to the deficient system of manuring practised. Ripe-rot caused by (*Gloeosporium musarum*) was last year evident in the case of large numbers of bunches.

Owing to steady emigration from the Canaries to Cuba, the fruit business of the islands is suffering much from want of labour. The profits of the banana industry are also stated to have been diminished by the increased cost of irrigation, and as the result of the keen competition exercised by the Jamaica fruit on the British market.

In regard to the destination of the banana shipments, the great bulk, 2,119,684 crates, went to the United Kingdom. This quantity is, however, less by 165,000 crates than the British imports of Canary Islands bananas in 1906. On the other hand, the exports to several European countries show a considerable increase. Germany took 168,098 crates of bananas, France 77,510 crates, and Spain 26,005 crates.

The British Consul expresses the belief that with increased facilities for shipment to Continental ports, the shipments of bananas in that direction would largely increase. It is evident that the French and German people are acquiring a taste for the fruit, and that with the provision of a better system of shipment and distribution, a largely extended market for the banana will be found.

A considerable proportion of the bananas shipped to Marseilles is re-exported to Egypt, where, it is stated, the fruit finds a ready sale, despite the high price at which it is retailed.

The steamship companies engaged in the transport trade recently combined, with one exception, to increase the freight charges from the Canaries to Great Britain.

At the beginning of 1907, the cost of transport to London was 1*s*. 3*d*. per crate, plus 10 per cent. of the value. Towards the end of the year this was raised to 1*s*. 3*d*. per crate, plus 10 per cent. The rate to Liverpool was reduced to 6*d*. per crate, but afterwards advanced to 1*s*. This increase of freight charges has caused a good deal of dissatisfaction among producers, and rates will possibly be again reduced.

THE ROSELLE OR RED SORREL.

Considerable attention has, during the past few years, in the Hawaiian Islands been given to the cultivation and utilization of the red sorrel (*Hibiscus sabdariffa*), so well known in the West Indies. The plant has been grown at the Hawaiian Agricultural Experiment Station, and the fruits made into jams and jellies. The following details are given in the report for 1907 on the work of the station, as to methods of cultivation of the plant :—

In Honolulu it is best to plant the seeds of the roselle in boxes or seed beds towards the end of February or early in March, and to transplant to the open field when the plants have attained a height of 6 or 8 inches. Seed planted before this date has produced plants which have borne prematurely and have not produced the main crop earlier than those from the seed planted later. The plants should stand about 3 to 4 feet apart in the row, and the rows from 4 to 6 feet apart. If the soil is good and moisture abundant, 4 by 6 feet will not be too great a distance.

The soil for the roselle need not, however, be the richest, but good soil will yield correspondingly good results. A small amount of after-cultivation will be necessary in order to keep the soil well tilled and supplied with moisture.

The yields in the experiment conducted at the station would average from 6,000 to 7,000 lb. per acre with a very moderate use of water. The cost of picking these fruits would be from ½c. to ¾c. per lb. If produced in sufficient supply to become a regular article on the market, they would probably command a price of 4c. per lb. Allowing ¾c. for the cost of gathering and ¼c. for packing materials, there would remain 3c. per lb., as the value of the fruit on the plants. Taking the yield at 6,000 lb., this would represent a value of $180 per acre for the crop in the field.

Messrs. Pickford & Black report that from January 1 to June 30 of the present year they shipped over 35,000 barrels of flour from Canada to the West Indies and British Guiana, as compared with 20,000 barrels shipped in the first six months of 1907. (*Maritime Merchant*, July 9, 1908.)

HONEY PRODUCTION IN CALIFORNIA.

Bee keeping is an important industry in California as may be judged from the fact that in a good season as much as 9,000,000 lb. or 4,500 tons of honey are produced. Southern California furnishes the largest contribution, the San Joaquin valley coming next. The British Consul at San Francisco, in his latest report, gives the following interesting particulars in regard to the methods followed by the Californian apiarists:—

Most bee-keepers in California consider 100 to 300 hives sufficient for any one farm. The honey gathering is usually from April to September, depending upon the weather and the length of the blooming period of the bee forage. The extracting season commences in May or June and is usually about six or eight weeks in duration. Much of the Californian product consists of the famous mountain sage honey which is said to be the mildest flavoured honey in the world. In the northern part of California bees gather their stores from the flowers of the carpet grass and the eucalyptus; in the central counties from alfafa and orange blossoms, white, black, and purple sage, sumach and wild buck-wheat.

The method of honey extracting is interesting. Details vary in different apiaries, but in one called the model apiary the process is as follows: With a hand car or small truck the apiarist stops beside a laden hive; this hive is of two stories, sometimes three. With a thin-bladed knife he loosens one edge of the lid, which the bees always glue fast, and thrusts the mouth of the smoker beneath it. With quick pressure of the bellows he sends the smoke into the chamber and the bees hurry below to avoid suffocation. He lifts the combs and brushes away the stupefied bees. If the honey is capped over, or partially so, he puts the combs into wooden-handled baskets made for the purpose, and when he has a load the car is pushed to the extracting house.

Well-filled comb hives weigh from 8 to 12 lb., according to thickness of the comb and the specific gravity of the honey. Inside the extracting house is a deep tin-lined uncapping box occupying nearly one whole side of the room, and in this box the frames are suspended until wanted. Uncapping is largely done by women. The frame containing the comb is balanced on one edge of the uncapping box and the operator with a long knife dexterously slices off a thin sheet of wax, thus destroying the cell seals. As the combs are uncapped they are placed in the baskets of the extractor, which are reversible, and the honey is thrown out by centrifugal force. From the bottom of the extractor runs a 3-inch pipe on a gentle incline to a tank outside the extracting house. This tank will hold several thousand pounds of honey. Across the opening of the pipe where it leaves the extractor is fastened a section of wire netting with rather coarse meshes to keep pieces of comb or refuse from passing into it.

In the top of the receiving tank is suspended a white flannel bag 2 feet in length, in the upper part of which is run an iron hoop some 1 foot 3 inches in diameter, and which just fits the opening in the tank; this further strains the honey. The honey is then drawn into tin cans, holding from 12 to 60 lb. each.

RICE CULTIVATION IN HAWAII.

Rice is the agricultural product of second importance in Hawaii, coming next to sugar—although far below it—in magnitude and value. The rice area extends over more than 1,000 acres, and is carried on chiefly by small proprietors and holders. The largest plantations are not more than 100 acres in extent, and the rentals of rice lands are high, ranging from $10 to $50 per acre per annum, including the provision of facilities for water supply. The fact that remunerative returns can be obtained after payment of the above rentals indicates the profitable nature of the industry.

Careful and continuous cultivation is practised, and the crop yields obtained in Hawaii compare favourably with those given in other rice-growing countries of the world. Two crops a year are usually grown on the same land, thus occupying the ground continuously, especially when slow-maturing varieties are grown. The usual practice followed is to propagate the seedlings in seed beds, from which the entire crop is transplanted by hand.

The average annual yield (two crops) on good lands in favourable localities is 6,000 lb. of paddy per acre, while 8,000 lb. or more is not uncommon. At present prices, which are exceptionally good, an acre will produce a crop valued at from $100 to $200. The estimated annual value of the Hawaiian rice crop in a favourable year is approximately $2,500,000.

In the year 1906, a series of experiments dealing with rice cultivation was started at the Hawaiian Agricultural Experiment Station. These experiments, which deal with the fertilizer requirements of the rice plant and of rice soils, the development of superior strains of rice of the old varieties, selection of new varieties, a comparison of the yields obtained from broadcasted, drilled, and transplanted rice respectively, etc., were continued during 1907, and an account of the progress of the work is included in the report for 1907 of the Experiment Station. The land on which the trials are being carried out has been under rice culture for a number of years, and although it has received no fertilizer for several seasons, yet it has invariably yielded crops approximating to 3,000 lb. of paddy per acre per harvest.

One of the most interesting of the experiments, and one which gave a definite result was that undertaken to test the relative value, for Hawaiian conditions, of two distinct methods of planting, viz., the direct sowing of seed, as practised in the Southern United States, and the Eastern method of transplanting, which, as already mentioned, is generally adopted in Hawaii. Seed was broadcasted at the rate of 50 lb. an acre, and another lot of the same stock of seed was drilled in rows at the same rate per acre. When well established the seedlings were thinned out to a stand of approximately 200,000 plants per acre, thus conforming as closely as possible with the number of transplanted plants per acre. One adjacent plot was set out with seedlings twenty days old at transplanting, and a second plot with seedlings thirty-five days old at transplanting. By far the best return of all, viz., 4,205 lb. of paddy and 4,024 lb. of straw per acre, was given by the plot planted with the seedlings twenty days old at transplanting. The cash value of the paddy return per acre from this plot was $105·12. The plot planted with the older seedlings and that on which the seed was drilled gave returns very nearly equal, but about $56 less in value than the return from the best plot. The plot on which the seed was broadcasted gave a return of slightly less value than the plot which was drilled.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows under date July 20, with reference to the sales of West Indian Sea Island cotton on the Liverpool market:—

> Since our last report, about 190 bales of West Indian Sea Island cotton have been sold, which include small quantities of Barbados and St. Kitt's at 15*d.* to 15½*d.*, St. Croix, Antigua, and St. Martins at 14*d.* to 15*d.*, together with about 50 bales stains at 6*d.* to 7*d.*, and 25 bales slightly stained at 1*s.*
>
> Prices are steady, but factors are not free buyers, pending the developments of the American crop.

COTTON MARKET IN THE SEA ISLANDS.

Messrs. Henry W. Frost & Co., of Charleston, in their fortnightly report on the American Sea Island cotton market, dated July 11 last, write as follows:—

> There has been a limited demand during the past fortnight for cotton for export to France, resulting in the sale of 77 bales, including 30 bales of 'fully fine' quality, sold at 30c. Apart from this the market remains quiet and unchanged.
>
> The factors and planters continue to hold the crop lots very firmly at 32c. and upwards, having decided to carry them over into the next crop if they fail to sell at their asking prices, hoping that there may be some improvement in the fine trade, which will admit of the spinners paying better prices.

In reference to the coming crop, Messrs. Frost write:—

> We have had good reports from all sections, and so far as we can learn, the crop is making favourable progress.

MANURIAL EXPERIMENTS WITH COTTON AT ST. KITT'S AND MONTSERRAT.

A report for the year 1907-8 on the manurial experiments with cotton that have been in progress at St. Kitt's and Montserrat since 1904 has been received from Dr. Francis Watts, C.M.G. Complete details of the scheme of manuring that is being followed in these experiments were given in the *Agricultural News* (Vol. III, p. 237), and summaries of the annual reports for 1904-5, 1905-6, and 1906-7 were published in Vol. IV, p. 263; Vol. V, p. 231, and in Vol. VI, p. 198.

The series of trials is a very comprehensive one, there being as many as thirty-eight distinct experiments. Further, all the experiments have been repeated three times every year, the seed in the first instance being sown in June, in the second instance in August, and in the third instance in September or October. At St. Kitt's, the experiments have now been conducted for four years on the same individual plots; i.e., every plot in the series has received a similar application of manure each season since 1904. The Montserrat experiments differed from those carried out at St. Kitt's, in that they were not conducted on plots which had previously received similar manures.

As in previous seasons, the application of artificial manures seems to have had little influence on the yield of cotton. For example, in the first series of experiments at St. Kitt's, i.e., the cotton planted in June, an average return of 1,165 lb. of seed-cotton per acre was obtained from the unmanured plots, a plot dressed with a complete artificial manure, containing nitrogen, potash, and phosphates, yielded at the rate of 1,172 lb. per acre, while the plot which had been given ordinary pen manure yielded seed-cotton at the rate of 1,242 lb. per acre.

In the case of the experiments with July-planted cotton, the unmanured plot gave 1,480 lb. of seed-cotton per acre, the plot which had received a complete dressing of artificials yielded at the rate of only 1,332 lb. of seed-cotton, while the plot which had been dressed with pen manure gave a crop of seed-cotton at the rate of 1,572 lb. per acre. Returns of a similar nature were obtained in the manurial trials carried out at Montserrat.

From the above returns, it is evident that an expenditure on artificial manures for the cotton crop is not justified in St. Kitt's or Montserrat, when the crop is grown under conditions similar to those which governed the experiments.

The general results of the experiments have shown that factors other than the application of artificial manures exert the most marked influence on the yield of cotton obtained. The crop requires that the land shall be in good condition, and it is the experience of planters that this condition is best served by the use of manures of the farm-yard type, or by green dressings.

Under the circumstances prevailing in the Leeward Islands, the crop return obtained with Sea Island cotton is evidently influenced more by the time of planting than by manuring with artificials. The variations in the yields obtained as the results of planting in June, in August, and in September or October respectively, were shown in the tabular statement given in the course of an article dealing with the cotton experiments at St. Kitt's that appeared in the *Agricultural News* of July 11 last (Vol. VII, p. 214).

The low return of seed-cotton obtained from the September-sown area—175 lb. per acre—and the fact that still lower yields were given each year in the past, appear certainly to indicate that sowing in this month is too late for cotton planters in St. Kitt's.

SCHOOL GARDENS IN ENGLAND.

The question of school gardens, and the methods of working them so that they shall be of the greatest value for the purposes of instruction, is discussed in a thoughtful article that appeared in the *Gardeners' Chronicle* of June 6 last. It is evident that in some parts of England, as in certain of the West Indian Islands, the full development of school garden work is hindered by the difficulty of obtaining sufficient and suitable land.

In the following extracts from the above-mentioned article the advantages of the system of working in which each pupil cultivates a separate plot are compared with those resulting from the cultivation in common by the pupils of a larger area, on which it is possible to carry out more extensive cultural operations:—

> Broadly speaking, there are two systems of school garden work in general use in England, and they sprang from the opinions of two clever and thoroughly practical gardeners, Mr. John Wright, V.M.H., who has had charge of the work in Surrey from its inception, and the late Mr. Robert Cock, in Staffordshire, these two counties having been pioneers of gardening as applied to teaching in elementary day schools. Much work is now being done in all the different counties, but it is largely based upon the experience that was gained at the outset in Surrey and Staffordshire.
>
> In Surrey, reliance is placed upon the individual plot system in which each scholar is assigned a piece of ground varying in extent from half a rod to a rod, and very occasionally slightly more; in Staffordshire the communal plot is adopted, on which all the pupils work together. The former system may fairly be expected to bring forth better individual results, for each boy proves his own merit by the results which he achieves. In the common plot the individuality of the pupil is merged into the whole, and it is difficult, if not impossible, to separate the keen and clever workers from the idlers, of whom there are specimens in every school: the large plot, however, has the advantage of allowing of superior instruction being given as to how an allotment or a cottage garden would be actually cropped and managed, with a view to the production of the utmost amount of vegetables from the area at command. Rotations are not now regarded as of the same importance as they were some years ago, but it is desirable that pupils should be given a knowledge of the chief rotations, and the advantages consequent upon their use, as in certain circumstances their adoption is imperative, and it is quite evident that these can never be as well and clearly shown on an area of half a rod or a rod as they can on 20 or 30 rods. The balance might appear to be in favour of the large plot, but something must be debited against it on the score of loss of individuality, coupled with the fact that the spirit of emulation or competition hardly enters into the matter at all. This is a matter deserving of consideration, as a boy will usually strive much more strenuously and persistently when he sees that his neighbour is getting ahead of him in regard to the appearance of his ground and his plants.
>
> The question arises as to whether it would not be possible to adopt a middle course between these two extremes and so to combine the best points of both. This might mean that each pupil should be provided, with a small plot—half a rod would amply suffice in this case, though as a general rule it is rather too small—and that in addition there would have to be one large plot, say of 12 rods, on which the class would work in common. If it were practicable, this system might perhaps be expected to produce the most satisfactory results, for the individuality of the scholars would be retained in its entirety, while the communal working would be advantageous in conveying instruction as to the actual cultivation of a garden. The larger plot would be cropped just as if it were in the hands of an allotment holder, and close account would be kept of the approximate value of the vegetables grown to set against the cost of production in manure, seeds, tools, etc.
>
> The chief objection to the universal adoption of the combined system lies in the fact that it would involve the utilization of more land. This is indeed a serious point, and one which, in many cases might prove insurmountable, for it is often difficult to find sufficient space to put down 16 plots of each ½ rod in area.

PRIZE-HOLDINGS COMPETITION AT GRENADA.

Reports on the results of the prize-holdings scheme in the parishes of St. John and St. David, Grenada, during the past year, have been received, and testify to the beneficial influence of these competitions, as shown in improved cultivation of the holdings of those peasants who took part. It will be remembered that in these competitions prizes are awarded in three classes to small cacao cultivators. Holdings eligible for the first class must consist of not more than 5 acres and not less than 3 acres of cacao; for the second class, not over 3 acres and not less than 2 acres, while holdings included in the third class must not be over 2 acres in extent.

In the parish of St. John, for the year 1907, there were nine entries in Class I, fourteen in Class II, and thirty-seven in Class III. Three prizes were awarded to cultivators in Class I, and six prizes were allotted in each of the two remaining classes.

In St. David's parish the prize-holdings scheme was started for the first time in 1907, but notwithstanding this, there were six entries in Class I, six in Class II, and fourteen in Class III. Three prizes were awarded in Class I, four in Class II, and seven in Class III. In both parishes the competition among those taking part was very keen, as evidenced by the closely approximating totals of marks gained by the several prize-winners. The maximum number of marks that could be gained by any cultivator was forty-five, and it is satisfactory to note that in St. John's parish one-half the competitors, and in St. David's two-thirds obtained a total of forty marks and over.

In their reports, the judges expressed strongly their opinion as to the excellent results brought about among the small cultivators of the two parishes, by the prize-holdings scheme, and recommended that every effort should be made to continue its working for five consecutive years.

The following note occurs in the report on the competition in St. John's parish: 'The work done in these holdings has been excellent, and we consider that the prize-holdings scheme is encouraging not only better tillage, but also a greater amount of intelligent agricultural work among the small proprietors in the parish generally. In this year's competition—the second in the parish—the scheme has proved a much greater success than in 1906, both in the increased number of competitors, and in the improved quality of work done.'

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial discusses the breeds of poultry most suitable for West Indian conditions.

Interesting particulars in regard to the areas planted with different varieties of cane at Antigua and St. Kitt's will be found on page 243.

A brief article on the banana industry in the Canary Islands is given on page 244.

Rice is a crop of great importance in Hawaii and an interesting series of experiments in relation to its cultivation is in progress at the Experiment Station of the Hawaiian Islands (page 245).

The results of manurial experiments with Sea Island cotton, carried out during the past season at St. Kitt's and Montserrat, are summarized on page 246.

The prize-holdings scheme at Grenada is evidently doing good work among the small cultivators of the island (page 247).

Under 'Insect Notes' (page 250) will be found an article on the coleoptera or bettles, with special reference to members of this family found in the West Indies.

The effect of carbon bisulphide on soil fertility forms the subject of an interesting article on page 251.

Agricultural Conference Picture.

With reference to the reproduction of the photograph of the West Indian Agricultural Conference, 1908, that was presented as a loose supplement with the last number of the *Agricultural News* (No. 163), it should have been mentioned that the photograph was taken by Mr. C. Barentzen, of Bridgetown, Barbados, who possesses the copyright.

Rubber Exhibits from Dominica.

Through the agency of the Permanent Exhibition Committee of Dominica, a number of exhibits, the produce of the island, have been prepared and despatched to London for display at the International Rubber Exhibition to be held during September next. With the exception of two bottles of latex from St. Aroment estate, all the specimens sent are the produce of trees growing at the Botanic Station and were prepared by Mr. Joseph Jones, the Curator. Very few of the rubber trees growing on estates in Dominica have yet reached the age for tapping, hence it is not possible to send on a large exhibit of plantation rubber. It is hoped that the samples prepared at the station may prove of good quality, and serve to draw attention to the possibilities of rubber cultivation in Dominica. The exhibits include jars containing flowers, fruits, and seeds of *Funtumia elastica*, as well as jars containing seeds and fruits of *Castilloa elastica*. There were also sent bottles of latex from *Hevea brasiliensis*, *Castilloa elastica*, *Ficus elastica*, *Manihot Glaziovii*, and *Ficus Vogelii*, together with biscuits of Para, Castilloa and Ficus rubbers.

Beet Sugar Industry in Germany.

A tabular statement presenting full particulars of the beet sugar industry of Germany, and its variations during the past few years, is included in the latest British *Consular Report* on the trade of Berlin. From the figures given it is seen that there has been a small but consistent decline each year since 1901-2 in the number of sugar factories at work. In 1901-2 there were 395 sugar factories in operation; the number fell to 384 in 1903-4, to 376 in 1905-6, and to 369 in 1906-7. There is a tendency also for the area under sugar beet cultivation to decrease. In 1901-2 the area under sugar beet was 478,749 hectares [1 hectare = 2½ acres approx.]; it fell to 427,644 hectares in 1902-3, and to 416,714 in 1904-5. In 1905-6, however, it increased to 471,742 hectares, but in 1906-7 fell again to 446,963 hectares. The yield of beets per hectare has varied from 24·2 to 33·4 metric tons, while the average yield of sugar per metric ton [2,200 lb.] of beet has been about 319 lb. Owing to improvement in technical methods of treatment, only 6·8 lb. of beet are now required to produce 1 lb. of sugar. The total quantity of sugar produced was 2,182,361 metric tons in 1901-2, 1,822,491 tons in 1903-4, 2,314,779 metric tons in 1905-6, and 2,124,326 metric tons in 1906-7. It is stated that low prices account for the late falling off in the area cultivated.

Banana Growing in Mexico.

The climatic conditions of southern Mexico are admirably suited to banana cultivation, while the various streams and small rivers that occur provide facilities for transportation of the fruit to the coast. Under these circumstances the Mexican banana industry is becoming more important each year.

The cost of land in the republic suitable for the cultivation is from $10 to $15 per acre, and it is stated that the cost of clearing and making ready for planting amounts to an additional $40 to $50 per acre.

In growing bananas on the commercial scale, about 200 hills are allowed per acre, and there are four suckers to each hill. It is arranged, however, that these suckers are in different stages of development, the eldest bearing fruit, and the youngest just coming forth from the ground.

In an article dealing with the whole question of banana growing in Mexico that appeared in a recent number of *Tropical America*, there is given a tabular statement showing the average yield and net profit obtained per acre by growers of the fruit in the chief banana-producing countries According to this, a yield of 290 bunches per acre, giving a net profit of $68·75, may be expected in Mexico. Honduras comes second with a return of $66·84 per acre, while in Jamaica the net profit from banana growing is placed at $58·97 per acre.

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Botanical Expedition to Jamaica.

Dr. N. L. Britton, Director-in-Chief of the New York Botanical Gardens, accompanied by Mrs. Britton and Dr. Arthur Hollick, spent the month of March and the greater part of April last in Jamaica, on a visit of botanical investigation. In the May number of the *Journal* of the Gardens of which he is Director, Dr. Britton gives an account of the districts visited, and mentions the chief plants of interest that were observed on the expedition.

The total number of specimens collected aggregated 4 000, and Dr. Britton states on behalf of the party that the work added materially to their knowledge of the West Indian flora, and to its representation at the New York Botanical Gardens.

It was during this expedition that a primitive type of cotton was found growing wild over a considerable area between Portland Point and Rocky Point in the south of the island (see *Agricultural News*, Vol. VII, p. 150). As previously mentioned, seeds of this cotton were forwarded to the United States Department of Agriculture, and they will be grown in comparison with other cottons in the acclimatization and breeding experiments carried on by the Department.

Other districts visited by the party in search of specimens were the Salt Pond Hills, Great Goat Island, Bluefields, Savanna-la-Mar, Negril, the Great Morass of Westmoreland, Dolphin Head, Montego Bay, Runaway Bay, Bog Walk, and 'Fern Gully.'

Guayule Rubber in Mexico.

In futher reference to the Guayule rubber shrub (*Parthenium argentatum*), it may be mentioned that recent British Consular reports from Mexico state that, owing to rapid exploitation, the supply of plants has of late become very scarce. Remote districts are now being searched for the plant, and all the Guayule found is delivered under contract to the Continental Rubber Company of Mexico. The total quantity of the shrub that is now in existence in the republic is estimated at 400,000 tons, and practically the whole of this has been bought up at from £2 10*s*. to £7 10*s*. per ton. The purchases at the lower figure were made before landowners became aware of the scarcity of the plant, or realized that the slow rate of growth made it impossible for the supply to keep up with the demand under existing circumstances. It is feared that with the consumption of the existing supply the Mexican Guayule industry will go into decay.

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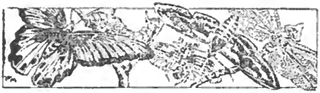
West Indian Bulletin.

The second number of Volume IX of the *West Indian Bulletin* has been issued in quick succession to part 1, and in it a further series of papers read at the Agricultural Conference of January last is reprinted, together with summaries of the discussions that followed. A short article on 'Cane Farming at Trinidad' by Professor Carmody, F.I.C., supplements the particulars given in a previous paper by the same author (*West Indian Bulletin*, Vol. VI), while the series of articles on the 'Polarimetric Determination of Sucrose' by Dr. Francis Watts, C.M.G., and H. A. Tempany, B.Sc., is completed in the present number. The paper on 'Root Disease of the Sugar-cane,' contributed by Mr. F. A. Stockdale, B.A., F.L.S., was summarized in the *Agricultural News*, Vol. VII, p. 65. A further paper dealing with the sugar industry is that by Hon. F. J. Clarke, C.M.G., on the 'Establishment and Working of the Sugar Industry Agricultural Bank at Barbados.'

Following after sugar, the cacao industry next received attention at the Agricultural Conference, and a series of papers dealing with various phases of cacao cultivation is reprinted in the number of the *West Indian Bulletin* under review. These include reports on the results of recent experiments with cacao at Dominica (contributed by Dr. Francis Watts, C.M.G., and Mr. Joseph Jones), at Grenada (by Mr. R. D. Anstead, B.A.), at St. Lucia (by Mr. J. C. Moore), and at British Guiana (by Professor J. B. Harrison, C.M.G.), and there are two papers by Mr. J. H. Hart, F.L.S., late Superintendent of the Royal Botanic Gardens, Trinidad, dealing with the 'Characters of Criollo Cacao' and with 'The Improvement of Cacao in the West Indies,' respectively. 'The Fungus Diseases of Cacao and Sanitation of Cacao Orchards' are discussed by Mr. F. A. Stockdale, B.A., F.L.S., while Mr. H. A. Ballou, M.Sc., contributes a paper on the subject of 'Thrips on Cacao.' The number closes with a brief paper, by Dr. Francis Watts and Mr. Joseph Jones, on 'Experiments with Citrate of Lime and Concentrated Lime Juice.'



INSECT NOTES.

Coleoptera.

The Coleoptera or beetles are distinguished from other insects by having the first pair of wings much thickened or hardened, forming covers for the membranous second pair, which are used for flight. The thickened pair are known as elytra, or wing covers, and they generally meet in a straight line down the middle of the back, while the membranous pair, called the true wings are folded beneath. The mouth parts of both larval and adult beetles are adapted for biting, and many species are injurious in both these stages.

The larvae of beetles are generally called grubs. They sometimes have three pairs of well developed legs and sometimes are without feet and legs. Beetles vary greatly in their habits, certain of them being among the most serious agricultural and household pests, while others are highly beneficial.

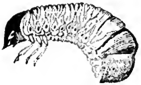


Fig. 7. Grub of Hardback.

The Coleoptera are divided into two principal groups, the true beetles (Coleoptera genuina) and the weevils (Rhynchophŏra). The essential difference between these two groups is that the weevils have the front of the head prolonged into a bill or snout, at the extremity of which the mouth parts are situated, while with the true beetles this development is absent. The true beetles are further divided into several groups, according to structure and habits, which for convenience may be named as follows: carnivorous beetles, club-horned beetles, saw-horned beetles, blade-horned beetles, plant-eating beetles, and lady-birds. The carnivorous beetles include the tiger beetles, the ground beetles, and the predaceous water beetles. One of the ground beetles (*Calosoma calidum*) has been reported from St. Vincent and Barbula as an active enemy of the cotton worm.

In the club-horned beetles the antennae are swollen to from a club or knob at the end. This group includes the large black water scavenger beetle (*Hydrophilus ater*) which occurs in pools of standing water in the West Indies. It is the largest of the water beetles, and may be seen frequently coming to the surface of the water, and again diving to the bottom.

The saw-horned beetles are so named because the segments of the antennae resemble in appearance the teeth of a saw. In this group are to be found the metallic wood borers, a few species of which occur in the West Indies. The larvae are borers in the bark and wood of living trees. The click beetles and the fire-flies also belong to this group.

The click beetles (Elateridae) are elongate insects having a peculiar structure by means of which they are able, if placed on their backs, to throw themselves several inches into the air. The larvae which are known as wireworms, live in the ground, feeding on roots and seeds, or in decaying wood. The most noticeable West Indian member of this family is the large fire-fly 'La Belle' (*Pyrophorus noctilucus*), of Dominica, St. Lucia, and other islands. Attempts have been made to introduce this insect into islands in which it is not naturally found, but it would be well to bear in mind in making such attempts that the larvae are liable to become pests to agriculture if the species is established in any island in which there is very little uncultivated or bush land.

The fire-fly family (Lampyridae), to which the small fire-flies belong is fairly well represented in the West Indies. The common fire-fly of the Lesser Antilles is *Aspidosomum ignitum*. The larvae of this family generally feed on soft-bodied insects, slugs, etc., and the adults of most species are said to be carnivorous also.

The blade-horned beetles (*Lamellicornia*) are so called because on the terminal segments of the antennae there are flattened projections (lamellae). This group includes some of the largest beetles known, and some which have most peculiar appearances from the remarkable development of mandibles or projections from the head or thorax.

The Hercules beetles (*Dynastes hercules*) is remarkable for its great size and for the enormous projecting horns, one of which arises from the prothorax, and the other from the head. These insects are found in the mountainous and wooded islands in the West Indies and in South America. To this group also belongs the common hardback (*Ligyrus tumulosus*), which occurs so frequently in houses at night, being attracted by the lights. The larva of the hardback is a white grub, and may be found in cultivated fields and gardens.

The larva of *Tomarus bituberculatus* is a borer of bananas and plantains, and has occasioned some loss in St. Lucia by attacking newly planted suckers.

The plant-eating beetles may be divided into three principal families: the leaf beetles (Chrysomelidae), the pea and bean weevils (Bruchidae), and the long-horned beetles (Cerambycidae). The leaf-beetles are represented in the West Indies by a considerable number of small insects, mostly small in size, which eat holes in the leaves of plants. The tobacco flea beetle (*Epitrix parvula*) occurs commonly on tobacco and other plants, and another flea beetle is often to be seen on the sweet potato. The tortoise beetle (*Coptocycla*) which also occurs on sweet potato leaves, is a very beautiful insect with its opalescent colouring. The pea and bean weevils are well known in the West Indies, and peas and beans stored for food or for seed are often found to be riddled with small round holes caused by these insects.

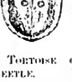


Fig. 8. Tortoise Beetle.

Fumigating with carbon bisulphide or immersing for two minutes in water heated to 140° F. will kill the beetles. *Bruchus chinensis* and *B. quadrimaculatus* are the common forms in the West Indies. 'Weeviled' peas are unfit for food, and should not be used for seed purposes.

The long-horned beetles include a large number of tree borers or bark borers which occur in the West Indies. They are distinguished by the extreme length of their slender antennae.

SCIENCE NOTES.

Effect of Carbon Bisulphide on Soil Fertility.

The researches of the past few years in soil bacteriology have produced information of the greatest interest to agriculturists. Everyone has come to recognize the rôle that is accorded to micro-organic life in the soil in the nutrition of higher plants, but it has yet to be demonstrated what are the relative importance of the physical, chemical, and bacteriological factors in soil fertility. Enough has been accomplished, however, to indicate that the biological processes are of equal importance with chemical, and physical processes in the soil, and therefore deserve equal consideration in studies of soil fertility. Our knowledge of soil-bacteriological processes has gained much from the investigations of the effect of carbon bisulphide on soil fertility, and, therefore, the following abstract from *Bulletin* No. 194 of the Office of Experiment Stations, United States Department of Agriculture, will be of interest:—

> In 1894 it was observed that the application of carbon bisulphide increased the crop-producing power of the soil, and it was shown that grape-sick soils in Germany could frequently be rejuvenated by the use of this substance. The exact manner of its action was imperfectly understood until it was demonstrated that it exerted certain influences upon the bacteria in the soil. It had been found that under normal conditions there is a certain equilibrium between the various groups of soil bacteria, and later it was shown that when carbon bisulphide was applied to the soil, its bacterial inhabitants were injured. The amount of injury varies with changing conditions of temperature, moisture, and amount of carbon bisulphide applied, as well as the duration of its action. The different bacterial species are depressed in their development in varying degrees, but this depression disappears after a certain interval, and is followed by a very rapid development. The general equilibrium amongst the different soil bacteria is thus destroyed, and the new development may follow along certain channels, resulting not only in an increase in number of soil bacteria, but also an abnormal predominance of certain species. The new conditions thus established for a time favour a more ready utilization of the stores of soil nitrogen, and also the fixation of atmospheric nitrogen by certain bacterial species. It is for this reason that the application of carbon bisulphide is followed after a time by a very decided increase in crop yields as compared with the corresponding yields for soils not treated. It has further been demonstrated that soils treated with carbon bisulphide showed not only an increase in their total nitrogen content, but also that this increase was the result of the more vigorous growth of the nitrogen-fixing *Azotobacter* species.

This action of carbon bisulphide may possibly assist us, partially at least, to understand the peculiar effects that have been noticed when green manuring has been practised with mustard, rye, and other non-leguminous crops. It has been noted frequently that crops of several non-leguminous plants when ploughed-in in the green state, have been followed, on nitrogen-poor soils, by greatly increased crops. Particular interest amongst scientific agriculturists has been awakened in England in certain experiments with mustard as green dressings, and the results obtained are being closely followed.

Drs. Voorhees and Lipman in their *Bulletin* allude to experiments with this plant as follows:—

> So striking were the benefits in some instances from green manuring with mustard that it was proposed in some quarters to include mustard among the 'nitrogen gatherers' rather than among the 'nitrogen consumers.' The first communication of Hellriegel and Wilfarth on the nitrogen-fixation by legumes, made twenty years ago, and the stimulated research in this field that followed their work, soon furnished conclusive proof that mustard is incapable of utilizing atmospheric nitrogen for its growth. But, as Heinze points out, there may have been more or less justification for this belief, so far as the indirect influence of mustard is concerned. It would seem that at times the action of mustard is not unlike that of carbon bisulphide in affecting the bacterial flora of the soil, and it really appears from facts already known that the green mustard substance in the soil retards the development of the acid-forming species of bacteria and encourages the growth of the nitrogen-fixing *Azotobacter* species.

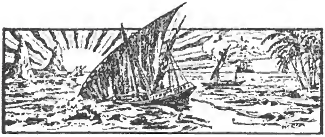
Other plants, such as buckwheat, rye, etc., have given similar results as mustard, and it is possible that similar effects may be produced on the bacterial flora of the soil. The question of the use of non-leguminous plants for green dressings has frequently been brought forward in several West Indian Islands, and it is hoped that experimental evidence as to their value may soon be forthcoming, while the question of a possibility of a 'bacterial weeding,' by which harmful bacteria may be reduced in numbers, and beneficial ones stimulated, is worthy of consideration. The effect that the toxic substance excreted from the roots of plants (see *Agricultural News*, Vol. VII, p. 238) may have upon the bacteria in the soil, or how far green dressings may neutralize its action, has yet to be investigated.

CACAO FROM BRITISH HONDURAS.

The following note on a sample of cacao received from British Honduras appears in the *Bulletin of the Imperial Institute*, Vol. VI, No. 1:—

> The sample of cacao from British Honduras was received at the Imperial Institute from the Colonial Office in 1907.
>
> The sample weighed 30 lb., and consisted of fairly large, plump, well-fermented beans, which possessed a good 'break' and were free from mouldiness. Its taste was mild and not excessively bitter.
>
> The quality was similar to that of the best grades of Trinidad cacao which reach the English market, and a firm of brokers to whom it was submitted stated that it would meet with a ready sale in this country. It was valued in London at from 110*s*. to 111*s*. per cwt., in bags, subject to the usual conditions, at a time when the finer grades of Trinidad cacao were quoted at 110*s*. to 112*s*. per cwt.

The enormous value of the sisal hemp industry to Yucatan planters is well known. During the year 1907, the hemp exported reached 100,773,916 kilograms, valued at $24,874,318. The quantity shipped is somewhat greater than the exports of the previous year, but owing to a fall in price, the return obtained was considerably less than that of 1906. (British *Consular Report.*)



GLEANINGS.

Tobacco cultivation in Ireland is making progress. The production has increased from 7,353 lb. in 1906-7 to 68,612 lb. in 1907-8.

Two experiment plots of Sea Island cotton have been laid out on the Balembouche estate, St. Lucia, and persons residing in the neighbourhood, and all who may think of taking up cotton growing in the island, are invited to inspect these plots. (*Voice of St. Lucia.*)

The Ayshire Bull 'Gipsy Star of Bellevue' stands for service at the Agricultural School, Union, St. Lucia. Fee 2s. per service. Stock-owners in St. Lucia may be reminded that the Ayshire breed of cows stands in the very first rank as milk producers, while the animals also possess good beef-producing capacity.

From the beginning of the season up to July 30 last, there were exported from Barbados 28,313 tons of sugar and 47,474 puncheons of molasses, as compared with 27,769 tons of sugar and 59,021 puncheons of molasses, shipped during the corresponding period of 1907.

At a recent meeting of the Steward Town branch of the Jamaica Agricultural Society, it was stated that a penny bank, started in connexion with the branch in March last, had made very good progress, and already £28 had been deposited. (*Jamaica Telegraph*, July 2, 1908.)

The pure-bred Ayrshire bull 'Duke of Truro II,' four years old, and now stationed at the Stock Farm, Agricultural School, St. Vincent, is offered for sale. The purchaser must enter into an agreement to keep the animal at St. Vincent for a period of at least two years, and not to charge more than 4s. per service. Offers will be received by the Acting Agricultural Superintendent, St. Vincent.

In the tobacco experiments carried out in Hawaii during 1907 about 3½ acres were under cultivation, and a crop of 3,000 lb. of the cured leaf was secured from this area. The best tobacco grown was the Sumatra, although the Cuban grades are also reported to have been of excellent quality. About 7 bales of the tobacco were distributed in small quantities to dealers in the United States and Europe.

The fact that the Cuban sugar crop of 1908 was short by about 500,000 tons, while the young canes planted for the crop of 1909 have suffered considerably from the same cause, has brought up the question of the possibility of irrigation on the sugar lands of the island. The *Louisiana Planter* recently stated that various measures for the improvement of agricultural conditions, including schemes of irrigation, are under consideration by the Administration of Cuba.

The rice shipments from Cochin-China (French) for the year 1907 amounted to 1,026,500 tons, this being an increase of 481,200 tons as compared with the exports of the previous year. In addition, 153,677 tons of broken rice and rice flour were shipped during 1907. Rather more than half the rice exports were shipped to China.

The exports of fruit from Jamaica to New York showed a healthy increase during 1907. The bulk of the Jamaica banana crop goes to the States, the exports to that country during 1907 having reached 1,254,000 stems. Shipments of oranges to the States, however, declined considerably, the crop being mainly sent to the United Kingdom and to Canada.

A large increase in the quantity of ground nuts usually imported into Marseilles took place in 1907. The quantity imported from Coromandel alone reached 1,385,000 bags, and prices obtained by producers kept at a satisfactory figure. Ground nut oil is largely used for soap making in the south of France, where, for this purpose, it is preferred to cotton-seed oil. (British *Consular Report.*)

Prospects for the autumn rice crop in British Guiana still remain good, according to recent reports, and with a continuance of suitable weather a record crop is anticipated, although the harvest is likely to be later than last year. Rice shipments from British Guiana to the West Indian Islands for the fortnight ending July 24 last amounted to 1,400 bags.

By an amendment recently made to the Customs Tariff of St. Kitt's-Nevis, it is provided that insecticides and fungicides which are certified by the Superintendent of Agriculture as being suitable for agricultural use, are to be admitted into the presidency duty free. The same Ordinance also provides that cotton seed, whether whole or crushed into meal, is also to be admitted free of duty.

In his report on the fruit industry during 1907, the British Consul at Malaga (Spain) states that the yield of lemons was a poor one, the total crop amounting to about 100,000 cases, of which 40,000 cases were shipped to Great Britain. The prices received varied from 8s. to 17s. (average price 10s. 6d.) per case, the grower paying freight. Bitter oranges are exported to Great Britain, via Seville, a return of about 10s. per case being obtained, but complaints were made that the market during 1907 was not a good one.

With the object of conveying useful information concerning the various phases of cotton cultivation, the Georgia State College some months ago organized a ten days' course of instruction for cotton growers from all parts of the State. The number who took advantage of this course was 104. Lectures on cultivation, manuring, treatment of fungoid and insect pests, seed selection, and ginning and baling the produce were given each morning, and these were supplemented by practical work in the afternoon.

The infestation of clover and alfalfa crops by the parasitic plant 'dodder' and the severe loss caused thereby throughout many parts of the United States have demanded special attention from the Department of Agriculture during the past year. Of late years the presence of dodder has been more noticeable in many countries, and the International Seed Control Congress held at Hamburg towards the end of 1906 pointed out to the governments represented, the necessity of taking steps to exterminate the pest. The dodder is a species of *Cuscuta*, and a near relative of the 'Love Vine' of the West Indies.

SWEET POTATOS.

Under the above title a very useful and interesting pamphlet (*Farmers' Bulletin 324*) has lately been issued by the United States Department of Agriculture. It contains a good deal of information as to the climatic and soil conditions needed by the sweet potato crop, the fertilizers that are most suitable, methods of preparing the land and setting out the plants, after-cultivation, harvesting of the produce, different varieties, etc., as well as details in relation to storing the crop, which, however, do not apply to West Indian conditions.

Sweet potatos thrive best on a moderately fertile, sandy loam, which does not contain an excess of organic matter. Farmers in the Southern States of America put a special value on the crop because it is one that can be grown upon soils which are too poor for the production of the majority of farm crops.

Good drainage is essential for the successful cultivation of sweet potatos. When the soil is too loose the potatos tend to be long and irregular in shape. For this reason it is not advisable to plough more deeply than 6 or 8 inches in preparing the land, since the best-shaped potatos are produced in a fairly loose surface soil overlying a firm subsoil.

Abundant application of organic fertilizers has been found to stimulate the growth of the potato vines at the expense of the roots. It is not advisable therefore to apply heavy dressings of pen manure directly to the crop. Such dressings should, in preference, be ploughed into the soil with the crop of the previous season. As a general rule sweet potatos will pay for judicious manuring with artificial fertilizers. It is recommended that a mixed fertilizer suitable for use on most sweet potato lands should contain from 3 to 6 per cent. of nitrogen, 6 or 7 per cent. of phosphoric acid, and 8 to 10 per cent. of potash. Such a mixture as the following would meet the above requirements: 200 lb. of high-grade sulphate of ammonia, 200 lb. of dried blood, 1,200 lb. of superphosphate, and 400 lb. of high-grade muriate of potash. Experience has indicated the necessity of having an abundant supply of potash in order to secure the best return with the sweet potato crop. In manurial experiments with the crop, the liberal application of potash has resulted in an increased yield of from 40 to 60 per cent. When large quantities of artificial manure are given, it is better to distribute the fertilizer at least ten days before planting and thoroughly to incorporate it with the soil, than to apply it in the row at the time the crop is being planted.

In the West Indies sweet potatos are regularly propagated by vine cuttings and this method is also followed in the Gulf States of America. In other States the crop is raised from 'seed' potatos, which are in some cases cut in several pieces, and planted in the row where the plants are to mature, or more frequently, allowed to sprout and grow for some time in the soil, and the vines so produced, taken and divided into cuttings from which the next crop is obtained. Propagation by vine cuttings is, of course, as a general rule, cheaper and more convenient, but the results of experiments have shown that it is advisable occasionally to have recourse to planting 'seed' potatos, since the crop certainly tends to fall off in yield when reproduced from vine cuttings only, year after year in succession.

Small potatos only need be used for planting purposes, or for the production of vine cuttings. They should, however, be uniform in size, and of the shape desired in the following crop.

Land that is best suited for sweet potato growing is easy to cultivate, and thorough preparation of the soil will be repaid by increased return, and greater ease in handling the crop later. Sweet potatos can well be grown in a rotation which includes cotton and a green forage crop, such as cow-peas, beans, woolly pyrol, etc.

In many parts of the Southern States sweet potatos are grown on land in the level condition, which has not been raised into hills. The vine cuttings or young plants are set out about 24 to 30 inches apart each way, so that from 7,000 to 11,000 plants are required per acre. Where the crop is grown on ridges, or hills, it is customary to have the ridges, from 36 to 42 inches apart, from centre to centre, and to place the plants 14 to 18 inches apart in the rows. It is always well to plant the crop when the conditions are most suitable to a quick start into growth, either just before a rain, or as soon afterwards as the land can be worked, since the sweet potato plant is one which responds readily to a moist condition of the soil.

After-cultivation of the crop consists chiefly in hoeing for the purpose of maintaining a mulch of loose surface soil, and for keeping down weeds. This surface cultivation should receive attention, more especially when the soil is drying after showers of rain, since at that time the upper layer tends to cake.

The varieties of sweet potatos recommended to planters in the above-mentioned pamphlet are few in number. They include Southern Queen, Pumpkin Yam, Georgia, Florida, and Red Bermuda, and the Jersey group, i.e., Big-Stem Jersey, Yellow Jersey, and Red Jersey. The Jersey potatos are drier and more mealy than the other varieties mentioned.

TOBACCO EXPERIMENTS IN THE BAHAMAS.

The accompanying notes on experiments in tobacco cultivation in the Bahamas appear in the *Annual Report* (1907) of the Board of Agriculture of those islands:—

Experiments in the production of cigar leaf tobacco from Cuban seed have been continued during the year. Seed was sown on August 28, 1906, plants set out from October onward, moulded from December 10, and the first ripe plants cut on January 31, 1907. The dried tobacco was bulked for fermentation on May 30, taken down and rebulked on June 11, and stripped and rebulked on July 8. The temperature in the pile rose to 120° F.

The area grown under tobacco was ¾ acre, and the crop resulted in a yield of 340 lb. cured tobacco. There has been a decided improvement in the quality of the tobacco grown in this experiment. The improvement of the quality of the Bahama leaf has called the attention of capitalists to the possibilities of this crop in the colony.

The cost of cultivation, curing and stripping was £8 9*s*. 6*d*.

Samples of tobacco grown and cured at the station have been submitted to leading leaf dealers and experts in England and America for their opinion. On their reports, which are favourable, the Board feels justified, if funds were available, in conducting further work upon a considerably larger scale.

The growing of tobacco has not been taken up so readily by the farmers, because of the lack of knowledge of the proper methods in cultivating, harvesting, and curing the crop. A special 'Bulletin' on the tobacco industry was published and distributed free in the tobacco-growing districts in the Out Islands. This bulletin contained full information on soil planting, cultivation, harvesting and curing.

RUBBER IN SOUTHERN NIGERIA.

The report on the Forest Adminstration of Southern Nigeria, for the year 1906, has just come to hand, and the particulars given in reference to the collection, preparation, and export of rubber show that this industry is of great importance in the Protectorate. The rubber is all obtained from wild forest trees and creeping vines, the chief sources being *Funtumia elastica*, *Landolphia owariensis*, and *Clitandra elastica*.

The total output of rubber for 1906 amounted to 3,434, 279 lb., valued locally at £307,077, as compared with 3,109,707 lb. of rubber, valued at £249,043, which was shipped in the previous year. These figures include the exports of Northern Nigeria.

Experience of the past few years with trees of *Funtumia elastica* indicates that this plant possesses much less recuperative power after tapping than is shown by Para rubber trees.

The most satisfactory methods for tapping Funtumia trees are stated to be the simple 'half-herring-bone', or the simple 'V' method, applied very lightly. It is reported that the Assistant Conservator of Forests carried out some tapping experiments with the spiral method, and procured a larger yield of latex than has so far been obtained by other systems, but it has yet to be ascertained whether such treatment has a depressing effect on the growth of the trees. Although the total quantity of Funtumia rubber exported from the Protectorate is very considerable, the actual yield obtained from each tree is small, and varies from 2 oz. to 3 oz. per tapping.

Dry Funtumia rubber contains, on the average, 80 per cent. by weight of pure caoutchouc, and the latex yields about 60 per cent. by weight, of dry rubber. In the preparation of the rubber in Southern Nigeria, the latex is, in general, either allowed to coagulate spontaneously, by exposing it to the air in shallow vessels, after dilution with water, or it is coagulated by heat, applied directly to the latex, or indirectly, by placing a vessel filled with the fluid in boiling water. Alcohol and acetic acid are also sometimes used as coagulating agents.

After coagulation has occurred, the lumps of rubber are washed, and pressed into the form of biscuits. If then properly dried in an atmosphere containing smoke, the biscuits acquire a rich brown colour, and the best qualities command a price not much less than Para on the London market. It is stated that samples of Funtumia rubber prepared by officers of the Forest Department were valued in Europe at 4*s*. 8*d*. per lb. at a time when fine Para rubber was selling at 5*s*. 2*d*. per lb.

The vine *Landolphia owariensis* is of rather slow growth, but the latex contains a very large proportion of rubber, and over 90 per cent. of the dry rubber consists of pure caoutchouc. The annual yield from a large vine varies from ⅓ to ⅔ lb. of rubber. The latex of Landolphia is frequently coagulated by treatment with hot smoke, while the methods mentioned above are also used. Landolphia rubber fetches a price of about 2*d*. per lb. less than that obtained for Funtumia rubber.

Efforts are being made by officers connected with the Forest Administration to introduce more skilled and careful methods of preparing the rubber, and as improved methods of treatment become general, higher prices will no doubt be obtained.

Para and Castilloa rubber trees have also been obtained and planted at the Botanic Stations both of the Western and of the Central Province. On account of unsuitable climatic conditions, the trees are not flourishing in the Western Province, while in the Central Province the Castilloa trees are reported to have suffered severely from attack by a boring insect. Para trees, however, have done well at the Botanic Gardens of the Central Province.

Mr. J. H. Hart reports (*West Indian Bulletin*, Vol. VIII, p. 198) that *Funtumia elastica* is being largely planted in Trinidad. During 1906 many thousands of seeds were sold, and plants to the number of 50,000 were distributed from the Botanic Station. Mr. Hart also mentions that rubber can be obtained from this tree at an earlier age than in the case of any other rubber-yielding tree.

IMPROVED PROCESS FOR THE PREPARATION OF RUBBER.

A patent for an improved process in the manufacture of rubber, and referring primarily to rubber obtained from Castilloa latex, has lately been taken out by Dr. Pehr Olsson-Seffer (in partnership with another). Particulars of the invention, together with illustrations of apparatus suitable for carrying out the preparation of rubber by this improved process, appear in the *India-rubber Journal* of May 4 last. The following is taken from the description given:—

According to this invention the latex—which is first treated with formalin or other preservative to prevent premature coagulation—is poured into the tank and diluted preferably with about an equal volume of water. It is then strained in a centrifugal or other apparatus to separate the latex from the bark, sand and other mechanical impurities, these being intercepted by a canvas or other screen. The strained material is then passed to a coagulating tank, which is conveniently steam-heated and provided with a worm or other conveyor. In this tank the latex is raised to the required temperature, which should not exceed 115° F., a small quantity of a suitable rubber preservative, such, for instance, as an alcoholic solution of creosote, salicyclic acid or carbolic acid, being added. In some instances, as, for example, when the latex is obtained from old trees, it is desirable at this stage to intermix with the material a coagulant, such, for example, as acetic acid, tannic acid, formic acid or cream of tartar, in sufficient quantity to obtain a neutral reaction of the latex.

From the coagulating tank the partially coagulated latex is passed into 'creaming' or settling vats or tanks, where it is allowed to stand, in order that the latex may separate from the mother-liquor owing to the difference in their specific gravities. This separation may take place in about two hours and the mother-liquor or the main portion of it is then drawn off from the bottom of the tanks and the latex washed by a stream of water which is passed upward from the bottom of the tank, whence it is received in any suitable receptacle.

The freshly coagulated rubber is then conveyed on a sliding table to washing rolls, which may be of the ordinary diamond-cut type, and rolled into corrugated strips. These strips are dried under vacuum until, say, only 6 or 7 per cent. of the moisture remains, when they are folded and pressed, preferably in a press which presses the rubber into blocks. Whilst still under pressure the rubber is submitted to a further drying process, and is then ready for packing and shipment.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of June :—

The condition of the spice and drug markets during the month of June has changed but very slightly, if at all, since our report for May. Any improvement at this season was scarcely to be expected, inasmuch as with the close of the half-year and the approach of the long summer holidays, buyers are not anxious to go beyond their immediate wants. No one article has attracted any special attention during the month, except perhaps, grey Jamaica sarsaparilla, the scarcity of which continues. It may be mentioned too, that the price of dragons-blood has increased to almost double the figure reached a year or two ago. As might be expected in the summer season when there is an increase in the consumption of cooling drinks, citric and tartaric acids, and lemon and lime juices were in demand. The following are the details of the articles chiefly affecting the West Indies :—

GINGER.

The month began well with this article. At the first spice auction as many as 1,000 packages Jamaica were offered and some 400 packages changed hands, either at the sale or afterwards, at the following prices ; 86*s*. to 98*s*. for fine, 75*s*. to 83*s*. for fair to good, 68*s*. 6*d*. to 73*s*. for low middling to middling, 60*s*. to 66*s*. for common to good common, and 56*s*. to 58*s*. for small mixed ratoon. A fortnight later about 900 packages were offered and about 150 sold at steady rates, good fetching 80*s*. per cwt. At this sale some 300 packages of Cochin and Calicut were offered and bought in. On the 24th, Jamaica was represented by about 700 packages, of which only 70 were disposed of at slightly easier rates, fair bright realizing 75*s*., and ordinary to good ordinary from 58*s*. to 65*s*. per cwt. There was also a good supply of Cochin and Calicut, all of which was bought in at from 90*s*. to 95*s*. for good bold selected, and 37*s*. for small washed rough Cochin ; some 30 packages of fair limed Japan were bought in at 29*s*. per cwt.

NUTMEGS, MACE AND PIMENTO.

At the first sale on June 3, West Indian nutmegs were in good supply ; about 400 packages were sold, the small and medium sizes realizing ¼*d*. and ½*d*. per ℔. lower, and the larger sizes ½*d*. to 1*d*. per ℔. advance on previous rates. At the last auction on the 24th, 165 packages West Indian were offered, and the bulk sold at steady rates. Mace has maintained a steady position during the month, the quotations being from 1*s*. 1*d*. to 1*s*. 3*d*. for ordinary to fair, 1*s*. 4*d*. for pale, and 9*d*. to 11*d*. for broken. Pimento at the first auction realized, for 80 bags of fair, from 2⅛*d*. to 2¼*d*. per ℔. A fortnight later some 360 bags of similar quality were offered and bought in at 2¼*d*. per ℔.

ARROWROOT.

This article has occupied very little attention during the month. On the 17th, 535 bags of good manufacturing St. Vincent were all bought in at 2¼*d*. to 3¼*d*. per ℔., and on the 24th, 38 barrels of fair manufacturing were bought in at 2⅛*d*. per ℔.

SARSAPARILLA.

At the first drug auction on the 4th no grey Jamaica was forthcoming. Five bales of native Jamaica fetched 1*s*. 1*d*. to 1*s*. 2*d*. per ℔. for fair red, 24 bales of Lima-Jamaica, ordinary rough, part dark to fair rolls, sold at from 1*s*. 3*d*. to 1*s*. 6*d*., and 9 bales of Lima-Jamaica and Guayaquil characters mixed realized 1*s*. 4*d* to 1*s* 6*d*. per ℔. On the 18th, 33 bales of grey Jamaica were offered, all of which were disposed of ; 11 bales of good, part slightly dark, fetched 2*s*. per ℔. A further 21 bales, slightly rough, also sold for 2*s*. For fair slightly coarse 1*s* 10*d*., very coarse and part dark 1*s*. 9*d*., and mixed 1*s*. 8*d*. Nineteen bales of native Jamaica were also offered and sold at the following prices : fair to good red 1*s*. 1*d*. to 1*s*. 2*d*., dull red and yellow mixed 1*s*., and common mixed 11*d*. per ℔.

KOLA, CASSIA FISTULA, LIME JUICE, TAMARINDS, ETC.

At the beginning of the month 50 packages of fair dark West Indian kolas were offered and all bought in at 2*d*. per ℔. On the 17th, 1 bag was offered and sold at 1½*d*. per ℔. for fair dried Jamaica. On the 4th of the month 11 bags of good long mostly fresh Cassia Fistula pods, from Dominica, sold at 17*s*. per cwt. A fortnight later a consignment of 23 bags of good bold Dominica pods realized from 17*s*. to 18*s*. per cwt. On the 4th, some 24 hogsheads of raw West Indian lime juice were offered, 17 of which were sold privately ; 1*s*. 3*d*. per gallon was paid for 7 puncheons of good pale. At the same auction a case of West Indian distilled oil of lime found a buyer at 2*s*. 7*d*. per ℔. West Indian tamarinds were reported at the beginning of the month to be arriving in fair quantities and realizing from 14*s*. 9*d*. to 15*s*. per cwt. Later in the month the prices for good West Indian had risen from 14*s*. to 16*s*., while East Indian were reported to be scarce.

LACE-BARK TREE OF JAMAICA.

The lace-bark tree of Jamaica (*Lagetta Lintearia*) forms the subject of a short article in the June number of the *Journal* of the New York Botanic Gardens, while the peculiar and interesting character of the inner bark, to which the tree owes its name, is well shown in the illustrations accompanying the article.

The lace-bark tree, which belongs to the Thymelaeaceae, is found in the central and western parts of Jamaica, and is also said to occur in Hayti. In its native wilds it attains a height of from 20 to 30 feet. Its ovate leaves are of a shining light-green colour, and are very attractive in appearance The flowers are fleshy, of a creamy white colour, and are borne in long slender spike-like racemes.

The tree has long been an object of interest on account of the lace-like character of the inner bark, which is made up of fibres arranged in several layers that may be stretched apart into a loose fabric. In former times people employed this bark in making caps, ruffs, bonnets, etc., and now, in Jamaica, the fibre is used in the manufacture of various fancy articles, such as doyleys, lamp-shades, fans, as well as in making riding-whips. It is stated too, that the Spaniards formerly utilized the bark in the preparation of rope.

In 1793 specimens of the lace-bark tree were first sent to Kew Gardens from Jamaica. These died, however, and it was not until 1844 that another attempt was made in this direction. Several young plants introduced in that year flourished, and one produced flowers and fruit a few years later. It is mentioned in the above-mentioned *Journal* that a specimen of the tree has lately flowered for the first time at the New York Botanic Gardens.

MARKET REPORTS.

London,—July 7, 1908, 'The West India Committee Circular; Messrs. Kearton, Piper & Co., July 21, 1908; Messrs. E. A. De Pass & Co, July 10, 1908.

Arrowroot—2½*d.* per lb.

Balata—Sheet, 2/- to 2/4; block, 1/7½ to 1/8.

Bees'-wax—Good quality, £7 10*s.* to £7 15*s.* per cwt.

Cacao—Trinidad, 63/- to 75/- per cwt.; Grenada, 54/- to 58/- per cwt.

Coffee—Santos, 29*s.* per cwt.; Jamaica, no quotations.

Copra—West Indian, £17 per ton.

Cotton—St. Vincent, 14*d.* to 15*d.*; Barbados, 14*d.* to 15*d.*; St. Kitt's, 14*d.* to 15*d.*; Montserrat, 14*d.* to 15*d.* per lb.

Fruit—

- **Bananas**—Jamaica, 4/6 to 6/- per bunch.
- **Limes**—Unsaleable.
- **Pine-apples**—St. Michael, 2/3 to 4/- each.
- **Grape Fruit**—8/- to 12/- per box.
- **Oranges**—Jamaica, 9/- to 13/- per box.

Fustic—£3 10*s.* to £4 10*s.* per ton.

Ginger—Quiet.

Honey—17*s.* to 27*s.* 6*d.* per cwt.

Isinglass—West India lump, 10/- to 2/- per lb.; cake, 11*d.* per lb.

Lime Juice—Raw, 1/1 to 1/4 per gallon; concentrated, £13 10*s.* per cask of 108 gallons; Distilled oil, 2/1 to 2/2 per lb.; hand-pressed, 4/3 to 4/6 per lb.

Logwood—£3 10*s.* to £4 5*s.* per ton; roots, £2 10*s.* to £3 10*s.* per ton.

Mace—Quiet; no quotations.

Nutmegs—Quiet.

Pimento—Quiet; 2½*d.* to 2¾*d.*

Rum—Jamaica, 3/- to 8/-; Demerara, 1/6 to 1/7½ per gallon; Trinidad, no quotations.

Sugar—Crystals, 18/6 to 19/6 per cwt.; Muscovado, 16/2½; Molasses, 14/- to 14/6.

New York,—July 10, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 14½c. to 14¾c.; Grenada, 12c. to 12½c.; Trinidad, 12½c. to 13c.; Jamaica, 9½c. to 11c. per lb.

Cocoa-nuts—Jamaica, select, $25·00 to $27·00; culls, $14·50; Trinidad, $24·00 to $26·00; culls, $14·00 to $15·00 per M.

Coffee—Jamaica, ordinary, 7¼c.; good ordinary, 7¾c. to 8¼c. per lb.

Ginger—10¾c. to 14c. per lb.

Goat Skins—Antigua and Barbados, dry flint, from 48c. to 49c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c., dry flint, per lb.

Grape Fruit—California, $1·50 to $2·50 per box.

Limes—$4·50 per barrel. Market over-stocked.

Mace—29c. to 30c. per lb.

Nutmegs—110's, 9¾c. per lb.

Oranges—California, $1·50 per box.

Pimento—4¾c. per lb.

Sugar—Centrifugals, 96°, 4·39c. to $4·42; Muscovados, 89°, 3·92c.; Molasses, 89°, 3·67c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. Leacock & Co., August 1, 1908; Messrs. T. S. Garraway & Co., August 4, 1908

Arrowroot—St. Vincent, $3·90 to $4·00 per 100 lb.

Cacao—Dominica, $14·00 to $15·00 per 100 lb.

Cocoa-nuts—$16·00 per M. for husked nuts.

Coffee—Jamaica, $8·50 to $10·50 per 100 lb.

Hay—$1·40 to $1·65 per 100 lb.

Manures—Nitrate of soda, $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $48·00; Sulphate of ammonia, $75·00; Sulphate of potash, $67·00 per ton.

Molasses—No quotations.

Onions—Strings, $2·07 per 100 lb.

Potatos, English—$3·00 to $3·50 per 160 lb.

Peas—Split, $6·60; Canada, $3·15 per bag.

Rice—Demerara, $5·46 to $5·90 (180 lb.); Patna, $3·80; Rangoon, $3·00 per 100 lb.

Sugar—Muscovado, 89°, $2·05 per 100 lb., package included; Dark crystals, $2·50; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—Messrs. Sandbach, Parker & Co. July 18, 1908.

Arrowroot—St. Vincent, no quotations.

Balata—Venezuela block, no quotations,; Demerara sheet, 52c. to 54c. per lb.

Cacao—Native, 14c. to 15c. per lb.

Cassava—80c.

Cassava Starch—$7·56 per barrel of 196 lb.

Cocoa-nuts—$22·00 per M.

Coffee—Creole, 10c. to 11c.; Jamaica, no quotations.

Dhal—$6·00 per bag of 168 lb.

Eddos—90c. per barrel.

Molasses—Yellow, 24c.; Dark, 22c. to 24c.

Onions—Madeira, 2¾c.; Lisbon, 2¾c. to 3c. per lb.; Dutch, no quotations.

Plantains—No quotations.

Potatos,—English, $2·60 to $2·75 per barrel.

Potatos, Sweet—Barbados, $1·68 per bag.

Rice—Ballam, $6·30 to $6·40; Creole, $5·30 to $5·60 for good; Seeta, no quotations.

Split Peas—$6·25 per bag (210 lb.); Lisbon, $4·59.

Tannias—$1·44 per bag.

Yams—White, $2·16; Buck, $4·00 per bag.

Sugar—Dark crystals, $3·24; Yellow, $3·82; White, $4·80 to $4·88; Molasses, $2·25 per 100 lb. (retail).

Timber—Greenheart, 48c. to 80c. per cubic foot.

Wallaba Shingles—$3·24 to $6·00 per M.

———**Cordwood**—$2·40 to $2·52 per ton.

Trinidad,—July 25, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$13·25 to $14·00 per fanega.

Cocoa-nuts—No quotations.

Cocoa-nut Oil—58c. per Imperial gallon, cask included.

Coffee—Venezuelan, 8½c. to 9c. per lb.

Copra—$2·60 to $2·80 per 100 lb.

Dhal—$4·75 to $4·85 per 2-bushel bag.

Onions—$1·50 to $1·60 per 100 lb. (retail).

Potatos, English—$1·40 to $1·50 per 100 lb.

Rice—Yellow, $5·40 to $5·75; White, $4·90 to $5·75 per bag.

Split Peas—$5·85 to $6·00 per bag.

Sugar—American crushed, $5·00 to $5·10 per 100 lb.

A FORTNIGHTLY REVIEW
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Sea Island Cotton Cultivation.

SEA Island cotton planting has been in active progress in many parts of the West Indian Islands for several weeks, but large areas are yet to be planted, and the present is an opportune time for again drawing the attention of planters to points in connexion with the cultivation which they will do well to observe.

In regard to the season for planting cotton in the West Indies, experience has shown that the most satisfactory results are obtained from areas that have been planted during the period from the beginning of June to the end of September. Within the limits mentioned, the planter must depend on local experience to guide him as to the most suitable date for sowing his seed, but the soil should be got into a good state of cultivation so that advantage may be taken of early showers of rain to start planting operations.

In the case of planters who may have had comparatively small experience in growing Sea Island cotton, the labour supply and the question of suitable soil will first need attention. It should be remembered that for the gathering of cotton an abundance of labour, more especially of women and children, is essential. As regards soil, although cotton has been grown on practically every type of land, it is now generally recognized that the best results are obtained from fairly light loams, capable of being easily worked. It is important that cotton land, more especially if of a heavy nature, should be efficiently drained, since it has been noticed that where the soil is retentive of moisture and the rainfall is high, the cotton produced has a tendency to become weak and wasty. On the other hand, even with a high rainfall, the cotton does not show these characteristics if the soil is of a porous nature.

Thorough and careful preparation of the land is most essential for success with the cotton crop, and is one of the chief factors in determining the ultimate yield, as well as the quality of the lint.

The land should be ploughed or forked and the surface soil well pulverized, some time before sowing takes place. The most successful cotton planters have found that improved results are obtained when the soil is allowed to mellow, or 'cool out', for a short time before planting.

The growth of cotton is attended with the loss of a considerable amount of organic matter to the soil, and it is essential that this should be replaced if good crops are to be produced. Where cotton forms the main crop of the estate, and is grown year after year on the same land, pen manure dug into the soil, and applied at the rate of about half the quantity usually given to sugar-cane, forms an excellent mode of supplying the humus lost. Another method is by growing cowpeas, or some other leguminous crop, and turning it into the soil. On sugar estates, however, where cotton is but a subsidiary crop, the pen manure supplied to the canes is sufficient also to meet the demands of the cotton. As regards artificial manures, their use in connexion with Sea Island cotton has not been attended with profitable returns at Montserrat or St. Kitt's (see *Agricultural News*, Vol. VII, p. 246). In experiments with cotton carried out at Barbados the best results were obtained from the application of 300 lb. high grade superphosphate, 40 lb. good sulphate of potash, and 100 lb. good sulphate of ammonia, per acre.

In regard to the amount of cotton seed required for sowing, it has frequently been pointed out in the publications of the Imperial Department of Agriculture that 6 lb. of seed per acre is a very suitable quantity under ordinary circumstances of planting. On sugar-cane land, the seed is usually sown at distances of 5 feet in the rows, and 20 inches from plant to plant in the rows, or the rows may be 6 feet apart with a distance of 18 inches between the plants.

It is a good plan to sow four seeds at each hole, about an inch deep. Later, three of the plants may be removed, the strongest only being left. It is recommended that not more than one plant be allowed to grow at each hole

The importance of selecting a good strain of seed for planting has been repeatedly urged by the Imperial Department of Agriculture, since the character of the seed has great influence upon the crop return obtained, and especially upon the quality of the lint. In the early stages of the cotton industry in the West Indies, cotton seed was selected, disinfected, and put on sale, by Officers of the Department. Many planters now do their own selection work, and selected and disinfected seed can be obtained from the cotton factories at Barbados, St Vincent, and Antigua. Planters should at least assure themselves that the seed planted by them is of good origin, i.e., from plants which in the past season produced lint of the best quality.

Disinfection of the seed is carried out by immersion in a solution of corrosive sublimate made up by dissolving 1 oz. of corrosive sublimate in 7 gallons of water. One gallon of this solution is sufficient to disinfect about 6 lb. of cotton seed, which should be soaked for twenty minutes, then removed, immersed in pure water for ten minutes, taken out and allowed to drain, and then spread out in a thin layer in the shade to dry. After this the seed is ready for planting. It is recommended that cotton seed should be treated only just before it is to be sown.

The young cotton plants should receive careful attention during the early stages of growth. The surface soil should be worked by hand implements with the double purpose of preventing it from becoming hard and baked, and of keeping it free from weeds. Constant watchfulness will have to be exercised for the first signs of insect pests as soon as the cotton plants are up. The cotton worm and the cut-worm are the most destructive among these pests. An effective method of treatment for attack by cut-worm is by the use of poisoned bait, consisting of a mixture of bran, molasses, and Paris green.

The cotton worm is well known to growers of Sea Island cotton in most of the West Indian Islands, and has already put in an appearance on one or two estates at Barbados where early planting took place. Supplies of Paris green and lime should be obtained, and on the first appearance of the worm the plants should be dusted with the mixture at the rate of 1 lb. of Paris green to 6 lb. of lime. In the past, this has been shown to be the most effective method of controlling the pest. During the coming season, in Barbados, at least, it is expected that extensive trials in the use of spraying machines will be made for applying insecticides in cotton fields.

The comparative value of spraying and dusting methods in the application of Paris green will be a matter of considerable interest, and the results obtained by the use of arsenate of lead, which can be applied only as a spray, will also be watched with interest.

The trials made last season on one estate with arsenate of lead indicate that this material will prove an efficient insecticide, and that its adhesive qualities will render it more resistant than Paris green to the washing of the heavy rains. This, it is hoped, may result in a saving by reducing the number of applications.

SUGAR INDUSTRY.

Trinidad's Sugar Crop.

A tabular statement giving particulars of the total sugar crop return of Trinidad for the season 1907-8, the tonnage of canes reaped from lands cultivated by estates' proprietors, the amount of sugar manufactured from these canes, the quantity grown by cane farmers and disposed of to various factories, the money value of the peasant-grown canes, and the number of East Indian and West Indian cane farmers respectively, was lately published as *Society Paper No. 327* of the Agricultural Society of Trinidad and Tobago.

According to this statement, the total output of sugar in Trinidad for the 1908 crop was 48,933 tons of various grades. This yield is nearly 2,000 tons short of the crop of 1907, but in the course of a lengthy review lately appearing in the *Port-of-Spain Gazette*, and dealing with this subject, it is mentioned that this shortage is more than accounted for by the fact that the estates and Usine of Mr. Norman Lamont, M.P., in South Naparima, from which 2,245 tons of sugar were exported in 1907, were not worked in 1908. The southern part of the island, i.e., Naparima and Savanna Grande, continues to be foremost in sugar production, having turned out 27,325 tons, or 56·2 per cent. of the total crop, as against 21,299 tons in the northern districts. The total amount of sugar produced from estate-grown canes was 36,340 tons, which was yielded by 380,334 tons of canes.

In the 1907-8 season, the farmers' canes grown and sold, amounted to 139,422 tons, and yielded 12,593 tons of sugar, while in 1906-7 the quantity of canes reached 169,709 tons. Last year, however, 18,343 tons were purchased for Mr. Lamont's factory; but allowing for this, it will be seen that the returns still show a falling-off of nearly 12,000 tons of farmer-grown cane in Trinidad during the past season. The shorter crop is attributed by the *Port-of-Spain Gazette* to the unfavourable growing season of 1907, rather than to a decrease in the area under cultivation. Indeed the opinion is expressed that there has been an increase in the acreage rented by the peasantry for sugar-cane cultivation. This area is estimated to be from 12,000 to 14,000 acres, and the total annual rental paid by the farmers to be about $8,750 sterling.

The cane farmers were paid $303,631 for their 139,422 tons of cane, a price which works out at $2·15 per ton. It is mentioned, however, that the canes cost the estates' proprietors an additional 32c. per ton for weighing and loading, and for hauling to the factory, etc. The cost of hauling the canes sometimes amounts to 24c. per ton. It is stated that, in those districts where it has been adopted, the sliding scale of payment for farmers' canes, with a minimum price of $2·04 per ton, has been found very satisfactory. The highest price paid was $2·40 per ton.

Cane farming was started in the southern provinces of Trinidad much earlier than in the northern, but advances have been made in the northern districts, and now 23·3 per cent. of the canes grown in the north are produced by farmers, while in the south the proportion of farmer-grown cane is 28·6 per cent.

In the returns, the number of cane farmers engaged in the industry during 1907-8 is given as 11,541, of which 5,922 are East Indians and 5,619 West Indians. In 1906-7 there were 12,334 cane farmers, 6,577 of these being East Indians, and 5,777 West Indians.

Sugar Industry in Vera Cruz.

The State of Vera Cruz is probably the richest in natural resources of any in the republic of Mexico. The soil in many districts is extremely fertile, and excellent crops of tobacco, sugar-cane, vanilla, maize, fibre plants, and fruits are grown.

In a report on the industries of the State, the British Consul states that the number of sugar plantations in existence is 164. Only about fifteen of these, however, are equipped with modern machinery for grinding, refining, etc. Six plantations have a light railway laid down for the more expeditious handling of the crop. In several cases the larger plantations belong to foreigners, and a considerable amount of foreign capital, chiefly from the United States, is invested in the industry.

The fertility of the soil is such that the average yield of cane per acre is said to be from 40 to 60 tons, and replanting takes place only about once in seven years. The cane grows luxuriantly, and on crushing, yields a juice of density from 9° to 11·5° Beaumé.

For the year 1907, the cane crop of Vera Cruz yielded 17,500 tons of sugar and 60,000 gallons of rum. The sugar exports showed a decline in 1905, and still more in 1907. This was partly caused by low prices obtained abroad, and partly by increasing home consumption.

The British Consul comments on the great progress that has taken place in connexion with the sugar industry of Vera Cruz of late years. Advanced methods of planting and harvesting are being introduced, and modern mills and refineries erected, while the old plantations are also being improved, and new machinery substituted for the old.

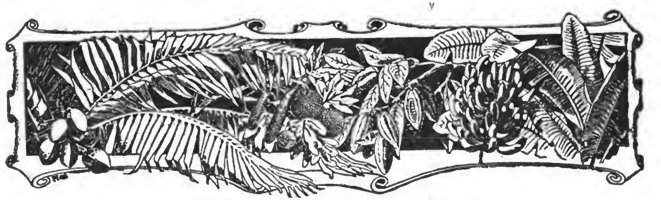
Most of the sugar machinery imported is of American manufacture, although British-made machinery has a good reputation.

'Diamond' Cane Crusher Roller.

The *International Sugar Journal* for July contains an account, with illustration, of a patent sugar mill roller of new type, known as the 'Diamond' patent roller, and invented by a Glasgow engineer.

The 'Diamond' roller replaces the usual top roller in a first crushing mill, and its functions are similar to those of a Krajewski crusher. The surface of the roller is very much corrugated, and owing to this form, it takes a very strong grip of the canes as they enter the mill, and thus a uniform feed is ensured. The inventor claims that the roller so thoroughly splits and breaks up the canes as they pass through the mill that an increased percentage of juice is extracted, while the crushed canes are in the best condition for the absorption of maceration water, and for the easy extraction of juice by the second mill. Further, it is said that the 'Diamond' roller not only increases the extracting power of the mill, but that it does so with about two-thirds of the power required with ordinary rollers.

This roller has been in use for two seasons on sugar estates in several parts of the world, and more especially in Java, where it is stated that it has given satisfactory results. On estates with milling plants which include Krajewski crushers, it has in many cases, when the plant is working at its full capacity, been found advantageous to fit a 'Diamond' roller into the first crushing mill. A special design of roller is also made for fitting in the second mills of triple crushing plants.



WEST INDIAN FRUIT.

BANANA GROWING IN CUBA.

Although banana growing is a more staple industry in some of the British West India Islands than in Cuba, yet a few hints on the subject, from an article that appeared in the *Cuba Review* for June last, are worth bringing before the notice of planters in these islands.

It is pointed out that the banana delights in a rich, moist, deep soil, that has an abundance of vegetable matter in it. Congenial temperature and rainfall conditions are even more important to the banana plant than suitable soil, and to do its best, and to produce large bunches of fine fruit the whole year round, it must have a liberal and regular supply of water. If its requirements as to moisture and temperature are concerned, it is well known that the banana will give fairly good results even on a poor soil.

The best time for planting the suckers is during the rainy season, from June to October, and stress is laid upon the importance of having the soil well tilled and prepared beforehand. The land should be ploughed or hoed to a depth of at least 9 inches, and afterwards harrowed until the soil is in a fine and mellow condition. Suckers from 2 to 4 feet high and with large well-developed bulbs should be selected for planting and set out at distances of about 14 or 15 feet each way. To give the plants a good chance of early development it is well to dig the holes about 30 inches deep, and 30 inches in diameter. If the soil is dry, the suckers should be liberally watered at the start. When the plants are well established, hoeing or ploughing between the rows, for the purpose of maintaining a surface mulch and keeping down weeds, is practised by many planters, and always attended with beneficial results. The banana grower in Cuba is recommended, in cases where the soil is poor, to sow cowpeas between the rows of banana plants, at the beginning of the rainy season, and to plough in the crop later on when the peas begin to ripen. In districts where the rainfall is small, the cultivation of cowpeas, in the way indicated, might tend to rob the bananas of the soil moisture they require, but under more favourable circumstances the practice would be as beneficial in Jamaica or Barbados as in Cuba.

The operation of pruning is very necessary and important in connexion with banana growing. Suckers that are not intended to bear fruit should be removed when not more than 1 foot to 2 feet high, and only two, or at the most three, stalks left to each plant. These should be at different stages of development, one being fully matured, while the other is only half-grown. Banana growers are well aware that if left without pruning, there would be too great a number of suckers, and the bunches of fruit would be small and poor.

The first bunches of fruit are produced in about eighteen months from setting out the plants, while the subsidiary suckers fruit when from twelve to sixteen months old.

The apple banana, which possesses an acid flavour (see *Agricultural News*, Vol. V, p. 404) is largely grown in Cuba for local consumption, while the plantain is also cultivated and used for cooking purposes.

The average crop of bananas yielded in Cuba, after the plantation has come into full bearing, is stated to vary from 200 to 600 bunches per acre per annum. The average price obtained is from 15c. to 20c. per bunch, according to size of bunch and season of the year.

THE SAPODILLA TREE.

The Sapodilla tree (*Achras Sapota*) is called the naseberry in Jamaica, and is a native of Mexico and other parts of Central America, where it is known as the 'Zapote Chico,' and is much valued on account of its different products.

The tree grows from 25 to 30 feet in height. It is very plentiful in some districts of Mexico, and its wood gives a most valuable timber. The wood of the sapodilla tree is of a clear, deep, reddish-brown colour, very hard, but fairly easy to work until thoroughly seasoned, when only the finest edged tools have any effect on its surface. The grain is of such density that the wood sinks when placed in water. The British Consul at Vera Cruz mentions that door frames, and other interior work in houses, known to be over a century old, made from the wood of the 'Zapote,' are as good to-day as when first placed in position.

Experiments in the use of the timber in port construction, for forming supports under sea-water, show that it is extremely valuable for this purpose, since, notwithstanding the influence of the water and the mud, the timber appears practically indestructible. In Central America, the milky juice yielded by the tree on tapping the bark, is evaporated, and forms the chicle gum of commerce. The business of producing this chicle has become a large and prosperous one in Mexico, the amount exported in the past year being over 2,200 tons, valued at more than $2,000,000 (Mexican currency). There is also an increasing output of chicle from British Honduras. This product is chiefly shipped to the United States, where it is used as the basis of chewing gum.

The sapodilla fruit is said to be much appreciated in America, and it stands shipment well. The trees are readily propagated by budding.

JAMAICA RUM.

The Jamaica rum industry, and rum production in other West Indian colonies and in Demerara received attention at a late sitting of the Whisky Commission, held at Westminster Palace Hotel, London.

Sir Daniel Morris, Imperial Commissioner of Agriculture, gave evidence, and handed in a number of official and semi-official papers on the subject. Among these were included reports on Jamaica rum by Mr H. H. Cousins, M.A., Director of Agriculture at Jamaica.

In reference to the subject of 'spurious' or 'artificial' rums imported from Hamburg to England, and which are of a highly flavoured nature, the Imperial Commissioner expressed his belief that this flavouring was due to the use of essences, in which there was undoubtedly a large trade for the purpose, and not to admixture with a proportion of highly flavoured Jamaica rums.

Sir Daniel's attention was drawn to a French book lately published, entitled *Le Rhum et sa Fabrication*, in which various statements were made which were calculated to damage the reputation of Jamaica rum, but he pointed out that the information published by Mr. Cousins, and now before the Commission, was sufficient to refute these statements. The Imperial Commissioner was quite satisfied that in Jamaica no doctoring of rum took place, except the process of colouring the product. The maturing of rum was a natural process, and at the present time they were producing rum with the object of obtaining early maturity. In two or three years it was hoped that Mr. Cousins would be able to put the industry on such a footing that its value to the island would be enormously increased. The conditions in Jamaica were such that no other country would be able to produce rum of exactly the same quality.

FAVOURABLE REPORT ON ST. KITT'S TOBACCO.

Samples of sun-grown Havana tobacco, as well as Virginian leaf, grown and cured at La Guerite, St. Kitt's, under the supervision of Mr. F. R. Shepherd, Agricultural Superintendent, were recently submitted by the Imperial Commissioner of Agriculture to Mr. F. V. Chalmers, the tobacco expert in London, and while the report received points out one or two defects in the tobacco, it is, on the whole, distinctly encouraging to those interested in the possible establishment of a tobacco industry at St. Kitt's.

Mr. Chalmers writes:—

The leaves of the Havana tobacco are too thick for cigar manufacture, but with an improvement in the burning quality, the product should prove marketable as a pipe tobacco. I am disposed to think that the poorness of the soil (with lack of potash) and imperfect fermentation are the principal causes for bad burning qualities and lack of aroma. I hope these two points will receive careful attention, and that the experiments will be continued. There is plenty of room in the world for more, and especially good, tobacco.

With regard to the samples of Virginia forwarded, I like the appearance of the tobacco. In order to compete with Virginia tobacco, from a colour point of view, the product should be yellow or nearly so. With other competent persons I have smoked some of the sample of Virginia both in pipes and in cigarette form, and find a trace of sweetness and aroma which I expected, and which is no doubt due to soil and climatic influences. It is a most pleasant and cool smoking tobacco.

Mr. Chalmers further mentions that he submitted a portion of the Virginia tobacco grown at St. Kitt's to the Admiralty, and he is willing to recommend that, so large a quantity as 25,000 ℔. should, if available, be annually purchased at a cost (including freight) of 6½*d.* per ℔., for the purposes of a tobacco mixture for the British Navy. This, it is stated, is the minimum amount that would be required, and with an improvement in the quality of the product, the demand would considerably increase. Should this recommendation of Mr. Chalmers come into effect, the result would be a great stimulus to tobacco growing at St. Kitt's, and possibly in other parts of the West Indies.

It will be remembered (see *Agricultural News*, Vol. V, p. 364) that some two years ago, on the recommendation of the same expert, the use of Jamaica tobacco, as an ingredient in a mixture with Virginian tobacco, was given a trial in the British Navy, and was favourably reported upon.

WAX-EXCRETING PALMS.

Among the most interesting members of the palm family are one or two species which excrete wax and deposit it on their leaves or on the stems. Probably the best known of these is the Carnauba palm of Brazil (*Copernicia cerifera*), while a second has latterly become known as the wax palm of Colombia (*Ceroxylon andicola*). An article dealing with these palms and the commercial uses to which the wax excreted by them may be put, appeared in a recent number of the *Gardeners' Chronicle*. It was mentioned in the *Agricultural News* (Vol. VI, p. 375) that specimens of the Carnauba palm exist in the Botanic Gardens in British Guiana, and seeds from these have been distributed to the Botanic Stations throughout the West Indies.

In the forests of Pernambuco and Bahia the Carnauba palm is found in great number. The tree grows to a height of 40 feet and measures about 1 foot in diameter at its base. The wax is excreted and deposited on the under side of the leaves, and the collection of this product has of late years become an important industry.

The wax is either scraped from the leaves on the tree, or the leaves themselves are gathered from the tree and the wax is afterwards removed. Since the product so obtained is in an impure state, and contains a large admixture of resin and other materials, it is melted, the impurities are removed by skimming, and the wax is run into moulds to harden.

Carnauba wax was, until recently, used in the manufacture of candles and also as a basis for such articles as boot polishes. The discovery of the fact that this wax was of special value for the purpose of making phonograph and gramaphone records, led immediately to a greater demand for the product and also to a large increase in its value. About 2,000 tons of the wax are annually exported from Brazil, and its value is placed at anything from £100 to £200 per ton.

The wax palm of Colombia excretes wax which is deposited not on the leaves, but on the trunk of the tree, and is frequently found between the scars left on the trunk by the petioles of the leaves, in deposits so thick that it can be removed in flakes. The average annual yield of one tree is said to be about 25 ℔. At present there is but a local demand for the wax, and it is used by the people of Colombia for making candles.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date July 31, with reference to the sales of West Indian Sea Island cotton on the Liverpool market:—

> Since our last report, there has been no demand for West Indian Sea Island cotton until yesterday, when 140 bales were sold at from 14*d.* to 15*d.*, at fairly steady prices, comprising Barbados, Antigua, St. Croix, St. Kitt's and St. Vincent.

COTTON IN THE SEA ISLANDS.

Messrs. Henry W. Frost & Co., of Charleston, in their Sea Island cotton report of July 25 last, state that during the fortnight previous to that date, the demand for Sea Island cotton was limited and resulted in the sale of only 61 bales at 35c., for export to France.

> Factors are holding odd bags and asking prices of 30c. for cotton of 'fully fine' quality, and 32c. for planters' crop lots. It is believed, however, that they would make some concessions in order to sell.

In reference to the crop prospects for the coming season, Messrs. Frost write:—

> The crops on the islands around Charleston have had favourable weather up to this time, and have been reported as very promising, but they are much in need of rain at this moment, whilst the advices from Beaufort are that they have had too much rain, and that the outlook is not good, with a prospect of the crop falling short of the return of last year.

COTTON CONFERENCE IN ENGLAND.

The Conference arranged between the West Indian cotton growers and Manchester spinners was held in the Council Room of the British Cotton-growing Association, at Manchester, from August 5 to 11, under the presidency of Sir Alfred Jones, K.C.M.G. The West Indian delegates, whose names were given in the *Agricultural News* of July 25 last, were in attendance, and there were present in addition, Mr. Conrad Watson from Jamaica, and the Hon. H. L. Thornton and Mr. Daniel Morris, jun., as representatives of Tobago.

As will have been seen from the public telegrams the proceedings were of a highly interesting character. Mr. Emmott, Deputy Speaker, welcomed the delegates on behalf of the House of Commons, and expressed the interest felt by the House in British cotton growing. Colonel Seely, Under-Secretary of State for the Colonies, said that whatever could be done by the Colonial Office to help the system of co-operation between West Indian cotton growers and Manchester spinners would be done. Sir Daniel Morris gave an address describing the progress of the cotton industry in the West Indies. Sir Alfred Jones regretted that, so far, Jamaica had not done so well as the other islands, and on behalf of his company, he offered to carry Jamaica cotton to England free of charge for one year.

A resolution was adopted on the motion of Mr. Hutton, Chairman of the British Cotton-growing Association, urging the Government to place the Imperial Department of Agriculture for the West Indies on a permanent basis.

A report of the proceedings of the Conference will appear in the next number of the *Agricultural News*.

LEGUMINOUS CROPS FOR COTTON LAND.

In the West Indies Sea Island cotton is chiefly grown as a subsidiary crop to sugar-cane and not as a main crop.

In the Sea Islands, however, and in Carolina and Georgia, where Sea Island cotton is grown at all, it usually forms the most important and profitable crop in the rotation. Under these conditions, one of the chief points needing attention by the cotton farmer is the best means of maintaining the fertility of the land for cotton cultivation.

Artificial manures are frequently applied, but in *Farmers' Bulletin 302* of the United States Department of Agriculture—'Sea Island Cotton,' it is stated that one of the chief factors for keeping the land in good condition is the adoption of a rotation in which leguminous crops are prominent. Cowpeas, velvet beans, and peanuts, all of which have been recommended for cultivation in the West Indies, are the chief crops of this kind grown, being found to give excellent results on the light soils most suitable for Sea Island cotton, and the rotation frequently extends over no more than two years, cotton being planted in one season, and a mixture of corn and cowpeas the second year.

On the whole, it is stated, the cowpea (*Vigna Catjang*) is the most popular and widely-grown leguminous crop for growth on Sea Island cotton land. The peculiar advantages of this crop are that the plant is well adapted to poor land, it is easy to cultivate, and the produce is valuable as food for man and stock. The Iron cowpea is specially recommended for growth in connexion with cotton.

The velvet bean (*Mucuna pruriens*, var. *utilis*) is another crop which constitutes a valuable source of humus, and adds a large amount of nitrogen to the soil on which it is grown. This plant grows very vigorously, and its vines afford excellent fodder for stock. The plant, too, is immune to most diseases.

NEW YORK LIME MARKET.

Lime growers in Dominica who may be thinking of making shipments of their fruit to New York would do well to note the accompanying paragraph from the Market Report of Messrs. Gillespie, Bros. & Co., dated July 24 last:—

The lime market continues heavily over-stocked, and while there is a little business doing it is of such a small character that it has no marked effect as to reducing supplies. A further hindrance to any improvement that might be anticipated is the extra large crop of Florida limes that has been experienced. This has fully supplied the Southern markets, and receivers of the fruit are practically accepting any bids they can get. Under these conditions we must again advise shippers to refrain from forwarding further lots, and to-day's nominal quotation is from \$3·75 to \$4·50 per barrel.

WIND-BREAKS FOR ORANGE GROVES IN PORTO RICO.

Orange cultivation is an industry of considerable promise in Porto Rico, and numbers of plantations are now being set out. A pest which is causing a good deal of trouble in the citrus groves is the orange mussel scale (*Lepidosaphes beckii* [Mytilaspis citricola]), and the 1907 *Report* of the Agricultural Experiment Station of the island mentions that experiments are in progress to determine the best methods of dealing with these insects. Spraying with kerosene has given fairly satisfactory results. It is stated, too, that Porto Rican planters now recognize that wind-breaks on the windward side of citrus groves play an important part in checking the spread of the scales. The following notes on this point are taken from the report:—

Wind breaks are divided into two classes—permanent and temporary. Permanent wind-breaks are generally planted on the outer borders of the groves, while temporary wind-breaks are planted between the rows of trees. There are several plants which grow very quickly, and afford good temporary wind protection, namely: bananas, sugar-cane, pigeon peas, and the China berry or Barbados lilac (*Melia Azedarach*). Temporary wind-breaks should not remain between the rows more than three years, and in the case of bananas a furrow should be ploughed on each side, thus preventing the roots from sapping the soil around the orange trees.

For permanent wind-breaks at the present time the mango seems to be the best, but in setting out the young trees they should be headed as low as possible. Bamboo is also being planted, and if the cuttings are set out during the rainy season they start much quicker. These should be planted close together, so as to form a hedge.

When brush land is being cleared for planting, it is advisable to leave a strip of uncut timber 20 feet wide every 300 to 400 feet. The results obtained from wind-breaks are very marked, certain groves which were wind-swept and were not growing at all having been brought into excellent condition. In almost every grove on the island marked improvements have been observed as the result of planting wind-breaks. In certain areas there may be found trees producing from 1 to 2 boxes of fruit, while trees not more than 50 to 70 feet away, and of the same age as the former, but without wind protection are frequently noticeable, which, from their development, might not be more than a year old. On the latter the branches are blown to one side and covered with scale. Trees protected from the wind require less spraying, and the fruit is free from scars.

THE COMING RUBBER EXHIBITION.

The International Rubber Exhibition that is to be held at the Olympia, London, from September 14 to 26 next, is an important event in connexion with a tropical agricultural industry that has of late years become annually of greater magnitude in many parts of the world. In the *Agricultural News* of March 21 last (Vol. VII, p. 21) full details were given of the arrangements then made in connexion with the Exhibition, and a later note (Vol. VII, p. 153) gave further particulars. The following note, from the *India-rubber World* of July 1 last, will give some idea of the scope of the Exhibition:—

Visitors to the Rubber Exhibition may be prepared to see rubber plants growing, in every stage from the earliest, together with sections of mature rubber trees and photographs of entire trees. Demonstrations will be given of all the methods of tapping rubber trees that have been devised to date, and specimens of tapping instruments will be on view. The various practices adopted in coagulating rubber will be shown, and specimens of crude rubber in all known forms, whether 'plantation' or 'wild' will be exhibited. In other departments of the Exhibition, visitors will be able to see a demonstration of modern factory processes for the conversion of crude rubber into finished products, and an array of manufactured goods into which rubber enters. The rubber manufacturer will there have an opportunity to study in all its phases the development of the raw materials: the producer of rubber will be able to see what the manufacturer wants in the way of raw materials, and by what steps his produce is turned into articles of commercial utility.

COST OF RUBBER PRODUCTION IN CEYLON.

The editor of the *India-rubber Journal* has latterly been making a tour in Ceylon and the East Indies, for the purpose of visiting rubber estates in that part of the world. In refereuce to the cost of rubber production in Ceylon he writes:—

I visited several rubber properties in the island possessing a large number of Para rubber trees of different ages but most of which had reached the tapping stage. In practically every instance the managers stated that they were able to produce rubber at a profit when the market price was 3*s.* per ℔.

The cost of production varies considerably in Ceylon, especially when the trees are of different ages. On one well-known estate the rubber during 1907 was delivered f.o.b. in Colombo at 1*s.* 1*d.* per ℔. On the same property it was estimated that, in the future, when all the trees on the estate had reached the tapping age, the cost would be reduced to 9*d.* per ℔. On another property, the cost of producing rubber, when dealing with young trees only, was 1*s.* 2*d.* per ℔., and when the rubber was obtained from old trees alone this cost was no more than 8*d.* per ℔. The estate is a large one, and the management hopes later to reduce the cost of production, including freight to London, to from 9*d.* to 10*d.* per ℔. of rubber.

On yet another property, where the average daily wage paid to the coolies was 6*d.* per day, rubber was being produced from young trees and exported to London, the cost, including freight and London charges, reaching 2*s.* per ℔. The manager was of opinion that this cost would be reduced to 1*s.* 4*d.* per ℔. as the trees matured.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

The *Agricultural News:* Price 1*d.* per number, post free 2*d.* Annual subscription payable to Agents, 2*s.* 2*d.* Post free, 4*s.* 4*d.*

Agricultural News

VOL. VII. SATURDAY, AUGUST 22, 1908. No. 165.

NOTES AND COMMENTS.

Contents of Present Issue.

The editorial deals with the chief points that should receive careful attention in the cultivation of Sea Island Cotton in the West Indies.

A review of the cane crop return of Trinidad for the past season, both from estates and from the lands of cane farmers, is given on page 259.

The methods followed in the cultivation of bananas by the best planters in Cuba are described on page 260.

A favourable report on the quality of tobacco produced at St. Kitt's has been received from an expert in London, who is willing to recommend the purchase of a large quantity of the tobacco, if available, for use in the British Navy (p. 261).

Cotton Notes (page 262) include market reports, a note on the Cotton Conference at Manchester, and a brief article on the cultivation of leguminous crops on cotton land.

The concluding portion of Mr. Ballou's article dealing with the Coleoptera or beetles is given on page 266.

A list of books recommended for the use of candidates, who propose to enter for the courses of reading and examination in Practical Agriculture, of which details were lately published by the Imperial Department of Agriculture, will be found on page 267.

Sugar Imports into India.

India produces far more cane sugar than any other single country in the world, but notwithstanding this, the annual crop falls far short of the amount needed to supply the home demand, and during 1907-8 no less than 559,000 tons of sugar, valued at £6,151,000, were imported into India.

Java is the principal source of supply, and in the past year furnished 63 per cent. of the sugar imports, while Mauritius provided a further 28 per cent. During the past four years the imports of sugar from Java and Mauritius into India have increased from 197,650 tons to 427,550 tons. In the same period the supplies of beet sugar from Europe, drawn almost entirely from Austria and Germany, have fallen from 85,800 tons to 39,700 tons.

Praedial Larceny in British Guiana.

Praedial larceny, or the theft of growing agricultural crops, is giving a great deal of trouble in various parts of the West Indies—notably in Jamaica and British Guiana. Steps are being taken in Jamaica to deal in a drastic way with the evil, and an amendment to the Summary Conviction Offences Ordinance of 1893 is about to be introduced into the Court of Policy of British Guiana for a similar purpose.

According to this amendment any person who steals or destroys, or attempts to steal or destroy, any cacao, cocoa-nuts, coffee, bananas, yams, sweet potatos, etc., shall be liable to a penalty of not less than $25, or imprisonment for one month, and not more than $250, or imprisonment for three months.

Further, in addition to the above penalties, it is provided that in parts of the colony where praedial larceny is at any time especially prevalent, the Governor-in-Council may declare these to be 'proclaimed districts,' and offenders within these districts are liable also to be whipped

Agricultural Shows at Trinidad.

The report lately presented by a Select Committee of the Agricultural Society of Trinidad appointed to consider the question of agricultural shows in the colony, should be encouraging to those who have advocated the extension of Peasant Proprietors' and School Shows.

In the past the Agricultural Society has devoted the sum of $250 per annum to be awarded in prizes at the local exhibitions. This sum has been administered under the auspices of the Education Department of the colony, and with very approved results. Owing to the interest taken in these local shows the Select Committee recommend that the amount of the Agricultural Society's grant be increased to $1,000 for the five shows to be held respectively at Port-of-Spain, Arima, Princes' Town, San Fernando and Scarborough. It is also advised that the exhibitions should take place in January or February.

At these exhibitions prizes will be given not only for fruit, vegetables and live stock, but awards will also be made to cane farmers, and for well-kept cottage vegetable and flower gardens.

Agricultural Progress in Uganda.

The chief agricultural products of Uganda in the near future will apparently be cotton, rubber, cacao, coffee, ground nuts, and chillies. In the annual *Colonial Report* (1906-7) details are given in relation to the production of the above articles, which show that satisfactory progress is being made.

Cotton cultivation is extending rapidly in the Protectorate, and will probably become the most important industry. In 1905-6, only 43 tons of cotton were exported, but in 1906-7 the shipments rose to 175 tons, while some hundreds of tons of unginned cotton were still in store at the end of the year

Rubber to the amount of 73,191 lb., having a value of £9,759 was exported in 1906-7. This represents an increase of about 40 per cent. compared with the exports of 1905-6.

Cacao trees grow well at the Botanic Gardens, and beans sent to the Imperial Institute have been very favourably reported on. Cacao does not yet figure in the exports, but it is expected that in the future it will become a prominent source of revenue.

Coffee plantations exist on a fairly large scale, but only 110 cwt. of coffee were exported in 1906-7. This is to a certain extent explained by a large local demand.

Ground nuts to the amount of 2,425 cwt. were exported during the year, while the quantity of chillies shipped was 29,370 cwt.

British Cotton Cultivation.

Abstracts of a series of reports prepared by Professor Wyndham Dunstan, F.R.S., on cotton cultivation in parts of the British Empire, other than India and Egypt, have been issued as a Parliamentary paper (*Colonial Reports.—Miscellaneous Series, No 50*).

The main portion of British-grown cotton is produced in East and West Africa. The cotton exports from the Sudan were valued at £23,000 in 1905 and £45,000 in 1906. The rate of development in Uganda is even more remarkable, cotton to the value of £11,400 being shipped in 1906-7, as compared with £1,089 in the previous year. Considerably increased shipments are also reported from Seirra Leone, the Gold Coast, and Lagos in West Africa. From the last-named place cotton to the extent of 2,440,000 lb., valued at £40,000 was exported in 1906, as compared with 1,281,000 lb. in 1905. In Lagos, it is stated, there are large areas of land suitable for cotton growing, but transport difficulties are a hindrance to extended cultivation.

The reports relating to South Africa show that Rhodesia and the Transvaal are capable of yielding cottons of excellent quality. As with New Guinea, and certain parts of the Australian colonies, however, where there are extensive areas the soil and climate of which are suitable for cotton growing, labour and transport difficulties are likely to give considerable trouble.

Considerable attention is given in the report to the development of the Sea Island cotton industry of the West Indies. In 1905 the exports of cotton and cotton seed from these colonies were valued at £63,000; in 1906 at more than £90,000, and for the year 1907 at £232,570.

Barbados Lemon Grass Oil.

In further reference to Barbados lemon grass oil, concerning which a note appeared in the *Agricultural News* of July 25 last, it may be mentioned that Messrs. Schimmel & Co., the well-known chemists of Leipzig, have reported very favourably on the quality of a sample recently submitted to them, which they describe as being especially valuable on account of its high percentage (90) of citral, and its good solubility.

Messrs. Schimmel & Co. point out, however, that the price of this product is still on the decline—and now stands at about 1¾*d.* per oz., as compared with a price of 8*d.* per oz. two years ago, when the question of its cultivation was first taken up in the West Indies. In view of this report, therefore, it would seem that for the present, there is no inducement for extending the cultivation of lemon grass in these colonies.

Agricultural Industries of San Domingo.

The agricultural methods practised in the republic of San Domingo are not of the most up-to-date description, but it is stated in the report, for 1907, of the British Consul, that there has been an improvement during the past two or three years.

The staple agricultural products of the republic are cacao, sugar, tobacco, bananas, and coffee. Cacao, for the cultivation of which there are extensive areas suitable in every respect in San Domingo, took the premier place among the exports in 1907, the quantity shipped being 9,983 tons. This is somewhat less than the amount exported in 1905 and 1906, but it is estimated that a protracted drought reduced the cacao yield by about 4,500 tons. The average price obtained ($13·35 per 100 lb.) in the past year was almost double that of 1905 and 1906, and this has encouraged planters to extend the cacao acreage. Practically the whole of the exports went to Germany, the United States, and France.

Owing to low prices the year 1907 was not a favourable one for sugar growers in San Domingo. In 1905, the sugar exports were 52,986 tons, having a value of $3,292,470, whereas in the past year, although the shipments were 54,100 tons, the value fell to $2,099,679.

The tobacco industry is in a flourishing condition, the exports for 1907—9,734 tons—being about 100 per cent. greater than in 1905. The price obtained for this product has shown a similarly satisfactory increase during the past two years. Germany takes practically the whole of the tobacco produced in San Domingo.

The banana trade of the republic is entirely in the hands of the United Fruit Company who own extensive plantations near Puerto Plata. The exports in 1907 reached 640,000 bunches, being much the same as in the two previous years. The price paid for the fruit was 2*s.* 1*d.* per bunch.

Coffee was shipped during the year to the extent of 3,376,970 lb., France being the chief purchaser.

INSECT NOTES.

Coleoptera.

(Concluded from the last issue of the Agricultural News.)

The long-horned beetles cause a considerable amount of injury to the trees they attack, and they are always more abundant on trees which are not in the most vigorous condition of growth and have not the same powers of resistance as ordinary trees. Trees suffering from lack of drainage, or from lack of fertility in the soil, or even from drought in some cases, are sufficiently checked in their growth to be more readily attacked by this class of pest.

The lime-tree bark borer (*Leptostylus praemorsus*) and the cacao beetle (*Steirastoma depressum*) are well known.

The lady-bird beetles (Coccinellidae) are very valuable assistants in helping to control the attacks of certain insects injurious to plants, such as plant lice (Aphidae), scale insects (Coccidae), and other small sucking insects.

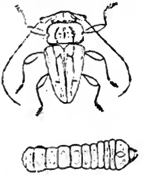


Fig. 9. Cacao Beetle and Grub.

These lady-birds are predaceous in both the larval and adult stages, and one or more kinds may be seen on almost any plant infested with the insects on which they prey. The most common form in the West Indies is the red lady-bird (*Cycloneda sanguinea*). The spotted lady-bird (*Megilla maculata*) is also common, and there are several species which though abundant and most useful are generally overlooked on account of their small size and plain colouring. These small lady-birds (*Scymnus* spp.) are frequently not more than $\frac{1}{16}$ inch in length, and they are dark-brown, black or steel-blue in colour.

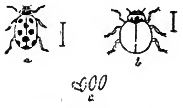


Fig. 10 Lady-birds. (*a*) *Megilla maculata.* (*b*) *Cycloneda sanguinea* (*c*). Lady-bird eggs. (All enlarged).

The weevils (Rhynchophora) include in their number some extremely troublesome pests to field crops, fruits and stored-grains, etc. The weevil borer of the sugar-cane (*Sphenophorus sericeus*), and the root borer of the sugar-cane) *Diaprepes abbreviatus*) are well known in many sugar-growing localities. The palm weevil (*Rhynchophorus palmarum*), one of the very large weevils, occurs in Trinidad, Dominica, and Grenada.

The sweet potato weevil (*Cryptorhynchus batatae*) has been very abundant during the past two or three seasons. In the Leeward Islands this insect is known as 'Jacobs,' and in Barbados as 'Scarabee.' Although a very small insect, about $\frac{1}{8}$-inch in length, it is a great pest, and when the attack on a sweet potato field is general and severe, the entire crop is lost. The larvae live in the potatos, tunnelling them through and through as they are getting ripe, and animals refuse to eat roots that are much tunnelled, in consequence of the most disagreeable taste and odour that are imparted to them by the weevils. The sweet potato borer of Jamaica and the Southern States is another weevil (*Cylas formicarius*) which is slightly larger and more elongate than the Scarabee. The golden weevil (*Diaprepes spengleri*) occurs in St. Vincent and is known as a pest on orange and other citrus trees in Porto Rico. The fiddler beetle (*Prepodes vittatus*) is an active enemy of orange trees at Jamaica and has been reported as attacking cacao. The rice weevil (*Calandra oryzae*) is of common occurrence, feeding on stored rice, corn, and grain of all kinds.

The remedies to be used in controlling beetles which occur as pests must of necessity be varied according to the habits of each species or group. Although they have mouth parts suited for biting, they cannot in all cases be controlled by the use of stomach poisons. Sometimes this is because the habits of the insects make it impossible to put poison within their reach, and in other cases because they do not respond readily to the effect of poison. This is especially true of many of the weevils which feed on the leaves of plants. It has been found that these insects frequently continue to feed on leaves that have been sprayed or dusted, and that they are not killed quickly enough by the poison to prevent considerable injury being done to the plants.

Root borers and other beetle larvae that live in the ground can sometimes be checked by adopting a rotation of crops, or by deep ploughing or forking. Borers in trees may be dug out with a sharp knife, or they may be killed by probing into their burrows with a wire. It is sometimes possible to prevent such insects from getting into the trees by coating the trunks with a thick lime-wash. Root borers, and other beetle larvae in the ground, bark and wood borers, grain beetles, pea weevils, etc., can be killed by the use of carbon bisulphide provided there is a suitable opportunity of applying it. The leaf-eating beetles may be controlled by the use of Paris green and lime, or other arsenical poisons, applied as a dust or spray. Poison bait, made of bran and molasses to which poison is added, is sometimes useful in combating beetle grubs in the soil. This poison bait is used in the same way as already recommended for the cut-worm.

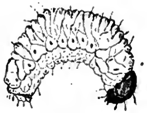


Fig. 11. Root Borer of Sugar-cane.

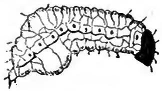


Fig. 12. Weevil Borer of Sugar-cane.

Clean agricultural methods, especially the clearing up of dead and decaying wood, which may contain the eggs or larvae of boring insects, and the removal of weeds, which may serve as breeding places for insects, as well as prompt treatment at the first appearance of any of the beetle pests, will often check a severe outbreak, and thus prevent damage to trees, crops, and stored products.

READING COURSES IN PRACTICAL AGRICULTURE.

List of Books Recommended for Candidates.

Details were given in a recent number of the *Agricultural News* (Vol. VII, p. 209) of courses of reading and examination in practical agriculture, which the Imperial Department of Agriculture proposes to establish in the West Indies for the benefit of overseers and sub-managers of estates. Below is given a list of books recommended for use by candidates in preparing for these examinations:—

'Elements of Agriculture,' by W. Fream (Published by J. Murray), 2*s.* 6*d.*
'Catechism of Agricultural Chemistry,' by Johnson (published by Blackwood & Sons), 1*s.*
'Chemistry of the Garden,' by H. H. Cousins (Published by Macmillan), 1*s.*
'The Soil,' by A. D. Hall (Published by J. Murray), 3*s.* 6*d.*
'Nature Teaching,' Imperial Department of Agriculture, 2*s.* 6*d.*
'Lectures to Sugar Planters,' Imperial Department of Agriculture, 1*s.*
'Sugar and the Sugar-Cane,' by Noel Deerr (Published by N. Rodger, Altrincham, Manchester), 7*s.* 6*d.*
'Introductory Manual for Sugar Growers,' by Dr. Francis Watts (Published by Longmans, Green & Co.), 3*s.* 6*d.*
'Cacao,' by J. H Hart (Published by Davidson & Todd, Trinidad), 3*s.*
'Cacao, its cultivation, botany, chemistry, and diseases,' by Herbert Wright (Published by Ferguson, Colombo and London), 7*s.* 6*d.*
'Tropical Agriculture,' by Nicholls (Published by Macmillan), 6*s.*
'Pamphlets published by the Imperial Department of Agriculture':—
No. 5. 'General treatment of insect pests,' 4*d.*
No. 7. 'Scale insects of the Lesser Antilles,' Part I, 4*d.*
No. 22. 'Scale insects of the Lesser Antilles,' Part II, 4*d.*
No. 17. 'General treatment of fungoid pests,' 4*d.*
No. 29. 'Lectures on the Diseases of the Sugar-cane,' 4*d.*
No. 45. 'A B C of Cotton Planting,' 6*d.*
No. 53. 'A B C of Lime Cultivation,' 4*d.*

Candidates should in all cases provide themselves with the books given in the above list. The pamphlets, etc., issued by the Imperial Department of Agriculture which are recommended, and also the *Agricultural News* will be supplied free of charge on application. Registered candidates at Barbados will be furnished, free of charge, with copies of the annual reports (in pamphlet form) on the Barbados sugar-cane experiments, while reports, also in pamphlet form, on the sugar-cane experiments at Antigua, and St. Kitt's, will be forwarded free to candidates in the Leeward Islands.

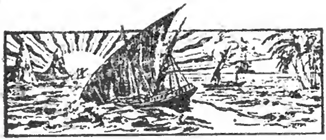
The books already mentioned form a list by no means exhaustive, and for further information, or for purposes of reference, candidates may in addition, consult any of the following volumes:—

'The First Book of Farming,' by Goodrich (Published by Doubleday, Page & Co., New York).
'The Soil,' by S. W. Fletcher (Published by Constable, London). Price 8*s.* 6*d.*)
'The Chemistry of the Farm,' by R. Warrington (Published by Vinton & Co.), 2*s.* 6*d.*
'Agricultural Physics,' by King.
'Manures and Manuring,' by C. M. Aikman (Published by Blackwood, Edinburgh).
The Farmers' Bulletins of the U.S. Department of Agriculture. (To be obtained from the Superintendent of Documents, Washington: 5c. each and postage).
The *West Indian Bulletin*, the Quarterly Scientific Journal of the Imperial Department of Agriculture for the West Indies.
The Reports of the West Indian Experiment Stations.
'Cane Sugar and the process of its Manufacture in Java', by H. C. Prinsen Geerligs (Published by N. Rodger). Price 5*s.*
'The Cotton Plant;' Bulletin No. 33. Office of Experiment Station, U.S. Department of Agriculture.
'Sea Island Cotton:' Farmers' Bulletin No 302; U.S. Department of Agriculture.

RICE CULTIVATION IN BRITISH GUIANA.

Certain phases of the rice industry of British Guiana are commented on as follows by the *Demerara Chronicle* of July 24 last:—

Within a few weeks rice planting on the East Coast will have been completed. Although the acreage under cultivation has greatly increased this year, all the lands intended for cultivation could not be cultivated owing to the scarcity of rice seedlings. This scarcity is due to the fact that the seedlings have not come up to expectations, and farmers can learn a valuable lesson from this experience. First, they must select the very best of seed, as on the seedlings depends to a very great extent the success or failure of the crops. When the seedlings are strong, not only do they grow with more vigour and mature earlier than when they are weak, but they are also able to resist floods and absence of water far better than the weak seedlings, the greater portion of which only result in successful crops when the weather and irrigation conditions are very favourable to their growth. Another lesson is, that too many seedlings must not be put into one hole and that the plants must be placed at reasonable distances apart. One of the reasons for this mistake in planting is, that many rice farmers believe that the more plants they put into a hole the greater yield is obtained. This belief is a fatal mistake and is a very fruitful cause of the production of blighted rice. The crop this year will be reaped better than that of last year, but notwithstanding that, if rains continue till August, the quality of the rice can be depended upon. The price of paddy this year may be higher than prices last year. The sole reason for this anticipation is, that a great quantity of the paddy that will be obtained is already pledged for loans obtained to assist the planters in their cultivation. At present paddy can scarcely be obtained on the Coast and rice is selling at some parts as high as 32c. per gallon. This scarcity of paddy and consequent rise of rice will continue and will be greatly intensified as time goes on, until the arrival of the harvesting season of the crop.



GLEANINGS.

The shipments of cacao made from Grenada during the period from March 21 to June 30 of the present year were 15,458 bags.

The Agricultural Society of St. Lucia recently imported Sea Island cotton seed to the value of £10 for the purpose of gratuitous distribution among the peasantry of the island.

There is a vacancy at the Agricultural School, St. Vincent, for an Assistant Master. The salary attached to the appointment is £45 per annum, with free quarters.

The English thoroughbred stallion horse 'Beau II,' now standing for service at the Stock Farm Agricultural School, St. Vincent, will not be available for service this year after September 30 next. (St. Vincent *Official Gazette.*)

The first tapping of cultivated rubber trees in the southern part of Trinidad took place on August 1. The trees in question were on an estate in Pointe-a-Pierre district, belonging to Sir Edward Tennant, Bart. (Port-of-Spain *Gazette.*)

The total amount of Trinidad cacao shipped during July last was 3,227,724 ℔. Of this, the United States took slightly more than half, viz., 1,735,738 ℔; France took 685,848 ℔., and the United Kingdom 335,853 ℔. Prices varied from 62*s.* to 64*s.* per cwt., during the month.

Mr. John Weatherhead, late of Bay estate, Barbados, has been appointed manager of the Balembouche estate, St. Lucia, and Mr. J. G. Salmon, deputy manager. It will be remembered that the Balembouche estate is the property of Messrs. Macfarlane, Junior & Co., on which they are starting the cultivation of Sea Island cotton in St. Lucia.

The growing of sisal hemp is reported to be a promising industry in the Hawaiian Islands. At present about 860 acres are under cultivation. Between 300 and 400 acres were to be cut during 1907, with the prospect of harvesting 600 acres in the present year. The whole of the output is shipped to San Francisco. (British *Consular Report.*)

Four trios of Indian Runner ducks, strong, healthy and of good laying strain, have been obtained from England by the Imperial Commissioner of Agriculture, with the object of extending the breed in St. Vincent and St. Lucia, and later on in other islands. It will be remembered that Indian Runner ducks have proved of special value in those parts of the West Indies where they have been already introduced. An article on the characteristics of the breed appeared in the *Agricultural News*, Vol. VII, p. 187.

In addition to the articles mentioned in the *Agricultural News* of July 25 last (Vol. VII, p. 231) as being about to be forwarded from St. Lucia to the Canadian International Exhibition at Toronto, several barrels of cocoa-nuts and of green limes for gratuitous distribution, together with decorative plants and grasses, were despatched by the C.L.S. 'Ocamo' on August 8.

Owing to the low price of nutmegs, it has been thought advisable in many cases in Grenada to cut out nutmeg trees in cultivations where they occur growing in connexion with cacao, and especially to weed out trees yielding small nuts or poor crops. A suggestion has lately been brought forward that growers might possibly start a small but remunerative industry by utilizing the outer husk of the nutmeg in the preparation of preserves.

The report for 1906-7 on the Basse Pointe Central Factory, Martinique, shows that during the season the factory handled 16,000 metric tons of sugar-cane. This was paid for by the factory at 8·163 francs [1 franc = about 9½*d.*] per ton. The factory sold its sugar in France at 24·30 francs (very approximately £1) and made a net gain of $1·06 per ton of cane bought. The capital of this factory is $140,000, and the reserve fund $46,660.

The *Annual Report* (1906-7) on Uganda mentions that rubber planting is extending in the Protectorate, and is being taken up by the natives. Para trees two and a half years old have attained a height of very nearly 22 feet with a girth of 8 inches at 3 feet above ground, while Castilloa trees, two and three quarter years old, are 12 feet high, and 17 inches in circumference at 3 feet above ground. One Para tree, five and a half years old measured 30 feet in height, and 17½ inches in girth.

Messrs. Sandbach, Parker & Co., of Demerara, report on August 7 that the rain which fell at the end of July and beginning of August was somewhat too heavy for very young rice plants but beneficial to fields in a later stage of cultivation. Conditions are however still satisfactory for the coming crop. There were no shipments of rice to the West Indian Islands during the fortnight previous to August 7, and there is very little cleaned rice on the British Guiana market.

The exports of rubber from Spanish Honduras have been of considerable value of late years. This rubber is produced from trees of wild growth, since little or no planting has been done. In 1906-7 the quantity shipped was 44,280 ℔., as compared with 46,346 ℔. in 1905-6. The decline is stated to be due to the fact that large numbers of trees have been ruined by continuous tapping. Honduras rubber commanded a price of about 4*s.* per ℔. in New York towards the end of 1906, but its value fell to 2*s.* 7*d.* per ℔. in 1907. (British *Consular Report.*)

Extensive areas of alkaline soils exist in the northern part of Egypt, which are, however, being gradually reclaimed by washing and drainage. Sodium chloride frequently forms the bulk of the salts present in those soils. Cotton is often the first crop planted on the reclaimed lands, and is said to be superior to most plants in its power to withstand alkali. The presence of a moderate amount of salt in the soil is generally regarded by growers in Egypt as beneficial to the cotton crop. It is said to check the tendency to excessive growth, to hasten ripening, and to improve the length, strength, and colour of the fibre.

AGRICULTURAL SCHOOLS.

The following are the general reports of the examiner, Mr. F. A. Stockdale, B.A., F.L.S., on the result of the half-yearly examination of the Agricultural Schools under the charge of this Department, for the period ended June last:—

ST. VINCENT.

Twenty pupils sat for the examination. Five took papers set for the senior class, eleven those set for the junior class, and there were four new boys.

The work throughout the school is now much more uniform, the lower boys having been improved. Robin is top of the seniors with 71·3 per cent. of the total marks. Samuel is top of the juniors with 66·6 per cent. In this class the progress made by Learmond is marked, for he has been but a short residence at the school. Wallace has also done well. O. Haynes is top of the new boys with 62·5 per cent. As the working for the year according to the present syllabus commences with the next term, I would suggest that T. Samuel, F. Frederick, and C. Arrindell be promoted to the senior class. Wallace has not yet been in residence for a sufficiently long period to be well grounded in the work and to receive promotion.

The science subjects are generally satisfactory and several of the answers sent in were creditable to the school. Agriculture and Botany have, on the whole, slightly improved, but Chemistry is still weak. This last subject has not been satisfactory for nearly two years. Some improvement was shown at the last examination, but this has not been maintained. I would recommend that during the whole of the next year this subject should receive careful attention and that extra instruction be given to the pupils.

In the general subjects some improvement has been made in Geography, and the Composition and Dictation papers were fairly satisfactory. Continued attention should be given to Geography, and it is necessary that improvement should be made in Arithmetic. In the last examination it was noted that many careless blunders were made in working out answers in Arithmetic, but they were more frequent at this examination.

The results of the examination of the new boys indicated what material has to be worked on at the school, and it will be interesting to watch carefully their progress through their course of instruction.

ST. LUCIA.

Seventeen pupils sent in papers for examination. Eight took those for the senior class, seven those for the juniors, and there were two new boys. Papers from five candidates for admission into the school were also submitted.

Gabriel is top of the seniors with 63·1 per cent. of the total marks; E. Joseph top of the juniors with 59·2 per cent., while Auguste and Moise are the best of the candidates. It is observed that Clovis, Welch, Daniel, Arrindell, St. Prix, and Clement have been doing the work of the senior class during the past half-year. As, however, the working for the year, according to the present syllabus, commences with next term, I would recommend that they all be allowed to continue with the work of the senior class, and I would advise that E. Joseph, who has made good progress, be promoted from the juniors. None of the other juniors should be allowed to proceed with the senior work; but they should continue to be grounded in the elements of the principles of agriculture.

The science subjects in the senior class show slight improvement, and they should receive further careful attention. Chemistry is still weak, and better drawings of specimens in Botany should be insisted upon. The Arithmetic is only fair, although improvement has been made in the neatness of the working. Geography, I am pleased to note, has slightly improved, but further attention should be devoted to this subject.

The junior class, with the exception of E. Joseph, sent in only moderately fair answers. All the science subjects should receive careful attention, and the boys should be thoroughly instructed in the elementary knowledge required of them. They should not be advanced too rapidly, and care should be taken to ascertain that they thoroughly understand the parts of the subjects taught them before other portions are dealt with. The general school subjects should also be carefully looked after, particularly Arithmetic and Geography, and attention should be given to writing and neatness.

The new boys were fair, while Auguste and Moise are the best of the candidates.

DOMINICA.

Seventeen boys sent in papers for examination; nine in the junior class and eight were new boys.

The work throughout the school has shown some improvement. The science subjects, however, have made but slight improvement during the last six months, and therefore they should now receive careful attention. The separate reports on the different subjects should be consulted and every effort made for improvement. Some of the boys have a fair knowledge of the elements, but I am of opinion that it would be advisable for the resident Master-in-Charge at the beginning of next term, to endeavour to ascertain how far the general principles of agricultural science are thoroughly known by the different pupils. Then, the essential points—particularly where any difficulties are experienced—could be plainly set forward and an attempt made to build upon the foundations that have already been laid. It would be most desirable that no attempt should be made to cram the boys, but that the elements should be insisted upon. Every effort should be directed towards inducing the boys to take an intelligent interest in the different operations in the field and to apply the knowledge taught them in the schoolroom in practice. Further, as the working for the year, according to the present syllabus, commences with the next term, I would suggest that only Carbon and Lachevotier be allowed to proceed with the work prescribed for a senior class. The remainder of the boys should repeat the work prescribed for the junior class, with which also the new boys will proceed. It might be found that such a large junior class could with advantage be divided into two divisions—an upper and a lower—in order that the new boys and the poorer of the present juniors should not keep back the more advanced of the pupils.

The general school subjects have shown some improvement. The Arithmetic was satisfactory, but continued attention should be given to the neatness of working out the answers. Marked improvement has been made in Geography and with further attention this subject may soon be quite good. The Composition and Dictation were fair. The writing and neatness were, on the whole, fairly satisfactory, but the spelling in the majority of cases is very weak. Attention should be given to this point.

Some of the new boys appear to be promising, but it must be urged that they should not be advanced too rapidly. Only elementary ideas in science subjects should be given them at present, and every effort should be made to improve the general school subjects.

USES OF SWEET POTATOS.

Sweet potatos form such a staple article of human diet in the West Indies that their cultivation for this purpose alone offers sufficient profit to growers, and the question of raising the crop for utilization in other directions has scarcely been considered. The following notes on other uses of sweet potatos, chiefly in compounding stock foods, may be of interest. They are taken from *Farmers' Bulletin 324* of the United States Department of Agriculture, a portion of the contents of which was summarized in the last issue of the *Agricultural News*, under the heading 'Sweet Potatos':—

The uses of the sweet potato as a table vegetable are too important and too well known to require more than brief mention in a publication of this character. In preparing them for the table they may be baked, boiled, fried, or braised.

A number of attempts have been made to build up an industry for the production and sale of dessicated sweet potatos and sweet-potato flour. There is doubtless a great field for this class of goods, especially for export and for ship supplies.

The vines of the sweet potato when properly cured make a medium grade of hay for feeding to cattle and sheep. In the green state the vines are eaten by sheep, cattle and hogs, but their feeding value is comparatively small. The potatos are fairly well adapted to feeding to animals, although their nutritive value is quite low, and they require the addition of cotton-seed meal or grain to make a balanced ration. On farms where sweet potatos are grown extensively, the culls are fed to hogs, together with one-third or one-half ration of corn.

By employing one of the heavy-yielding varieties of sweet potatos, such as the Southern Queen or the Bermuda Red, and drying and pulverizing them, a splendid stock food may be produced, especially when sufficient grain is added to form a balanced ration.

The principal uses of sweet potatos are, however, for the table, and the demand for this purpose is rapidly increasing.

From the fact that by the aid of commercial fertilizer alone sweet potatos can be grown on comparatively poor land, and largely by the use of labour-saving machinery, this crop may in a great measure solve the problem of how to occupy the 'worn out' cotton and tobacco lands of the South, especially if employed in a rotation including corn, peanuts, and grass. By the perfection of some means by which sweet potatos could be dried and converted into a condensed stock food on the farm, they would, in conjunction with corn, peanuts, and a little hay, serve to keep the stock on southern farms in good condition during the winter.

When removed from the ground the sweet potato contains about 71 per cent. of water, 1·5 per cent. of protein, 25 per cent. of carbohydrates, and 0·35 per cent. of fat. It will be noted that both the protein and fat of the sweet potato are comparatively low, and in order to form a satisfactory ration it is necessary to mix the sweet potatos with some material rich in those two constituents. The analysis of peanuts shows that the protein and fat are both quite high, and by combining the latter with sweet potatos at the rate of 1 bushel of peanuts ground in the shells, to 3 bushels of sweet potatos, a splendid stock food is produced. Three bushels of sweet potatos are nearly equal to 1 bushel of corn in feeding value, but in order to make them satisfactory as a stock food it is, as already pointed out, necessary to add peanuts, cotton seed meal or grain.

The starch and sugar content of sweet potatos varies considerably in different varieties, but as a rule they contain about 16 per cent. of starch and 4 per cent. of sugar, making a total of 20 per cent. of alcohol-producing material. It is possible that sweet potatos will become one of the chief sources of denatured alcohol in the United States, but at present the methods of manufacture have not been sufficiently perfected to warrant their use for this purpose on a farm or community basis.

SWEET POTATOS, CASSAVA, AND MAIZE AS FOOD FOR HOGS.

Some feeding experiments to test the comparative values of sweet potatos and cassava as pig foods have lately been carried out at the Florida Agricultural Station, and are reported upon in *Bulletin 90*, issued by the Station.

In the first test two lots of three pigs were taken. The first lot was given a ration composed of equal quantities of sweet potatos and 'shorts,' while the second lot was fed with a mixture, consisting half of cassava roots and half of shorts. The weight of sweet potatos in the first ration was equal to the weight of cassava in the second. The test was carried out for twenty-eight days.

With the sweet potato ration the average daily gain per head of the pigs was 1·83 lb., while the lot fed with the cassava ration gained 1·24 lb. per head per day.

The insufficiency of such starchy foods as sweet potatos and cassava to meet all the requirements of growing animals is emphasized by the results of a second test. In this four lots of young pigs in a lean condition were taken, and fed for forty-two days. The first lot received a daily ration of sweet potatos, the second of cassava, the third was fed on a mixture, in equal parts, of the two materials, while the fourth lot was fed on corn only.

At the close of the experiment period it was found that the corn-fed lot showed an average daily gain per head of 0·357 lb., while the animals fed with the sweet potato and cassava rations had actually lost weight. When this second experiment was repeated with larger pigs, the animals fed on corn gained an average weight of 1·152 lb. per head per day. On sweet potatos alone there was a gain of 0·505 lb. per head per day, on cassava 0·233 lb., and on sweet potatos and cassava together 0·179 lb.

The different results obtained in these two latter experiments are explained by the fact that growing animals require a ration containing a higher proportion of nitrogenous constituents and mineral matter than is needed by animals that have completed the growing stage. In the latter case no more nitrogen and mineral matter is required than an amount sufficient to replace the daily waste, and the animal is able to put on weight with the aid of a food consisting very largely of starchy or carbonaceous material.

It may be mentioned that 1 lb. of corn (maize) contains very nearly as much starchy matter, and more than twice the quantity of nitrogenous constituents, as 3 lb. sweet potatos. In a previous number of the *Agricultural News* (Vol. III, p. 330), in discussing the value of sweet potatos as a stock food, it was pointed out that the addition of ½ lb. of cotton-seed-meal, or 1 lb. of cowpeas, to every 10 lb. of sweet potatos supplied an amount of nitrogenous material sufficient to bring the standard of the mixture, as regards this constituent, up to that existing in maize.

PURIFICATION OF COCOA-NUT OIL.

The preparation of cocoa-nut oil forms a valuable industry both in Trinidad and Jamaica, and various notes and brief articles in relation to methods of preparation, etc., have appeared in past numbers of the *Agricultural News* (see Vols. II, p. 270: IV, p. 6).

After purification, the oil is suitable for use in a variety of ways (such as the preparation of articles of food, as margarine) for which it would not be available in its crude state. The following article dealing with the best methods of purifying cocoa-nut oil appeared in the *Philippine Journal of Science* for February last:—

Cocoa-nut oil, as it is expressed from copra, which has been dried in the sun or by artificial heat, always contains a quantity of impurities—organic colouring matter, albuminoid bodies and a certain characteristic odour, all of which are objectionable for particular purposes for which the oil is otherwise well suited. While it is quite possible to produce a pure oil directly from the nuts, if special precaution is taken in curing the latter, the demand for highly refined oil does not seem to warrant the introduction of modern mechanical methods of desiccation at the present time. Hence processes for the production of pure cocoa-nut oil depend on some subsequent chemical treatment of the commercially expressed oil itself. Clarification by filtration, subsidence, or heating with or without the addition of coagulants, is simple and economical of application and, as generally practised, removes all of the suspended foreign matter and most of the soluble impurities, producing a perfectly clear, light, amber oil of sufficient purity for soap manufacture, but it falls short of being completely free from odour and colour. Therefore, further refining constitutes the only known means of producing an odourless and colourless product suitable for alimental or cosmetic purposes. The removal of the last traces of odour and colour from cocoa-nut oil presents many difficulties in the way of subsequent clarification and risk of loss of oil, and the methods of procedure are necessarily limited to the use of such chemical reagents as are harmless or are themselves easily removable. In general, refining processes may be conveniently divided into (1) acid and (2) alkaline treatments. The former has not proved applicable for the production of oils for edible, cosmetic, or lubricating purposes, because of the poisonous nature and otherwise harmful action of mineral acids. The alkaline process makes use of the hydrates or carbonates of potash or soda, ammonia, caustic lime or magnesia, with or without the aid of heat. In purifying cocoa-nut oil by means of alkalies, only the minimum quantity necessary for the purpose of neutralizing the free acids present should be used. This amount can be determined accurately by testing the acidity of a small sample of the oil to be refined. If alkali is added in excess, and heating also takes place, then the oil itself suffers partial decomposition. Care must also be taken to prevent the formation of an emulsion on adding the alkali solution to the oil, and for this purpose experiments must be carried out to ascertain the concentration of the caustic soda solution which is least likely to bring about the emulsifying effect.

Ordinary commercial grades of cocoa-nut oil collected on the Manila market contain from 1 to 10 per cent. of free fatty acids calculated as oleic acid, and these percentages require approximately 0·15 to 1·5 parts respectively, of caustic soda per 100 parts of oil. The caustic soda may be added to the oil either in the solid state with subsequent addition of water, or better, in the form of a caustic liquor previously prepared. The stronger the caustic liquor used the less the tendency to emulsion formation and the more rapid and complete the action, if proper mechanical devices for thoroughly mixing a strong solution with the oil are used. If, after the addition of the caustic, the oil is gradually heated to the boiling point of water, the soap separates in a granular condition and is easily removed by filtration or subsidence. The oil may now be steamed and washed with hot water until it is perfectly clear and neutral, and if the above treatment with caustic liquor and the subsequent steaming, are properly conducted, the resulting oil will be found perfectly free from the well defined odour of the original oil, and to possess the bland, fatty odour of pure melted lard.

Cocoa-nut oil is also considerably lightened in colour by the above treatment, but in no sense can it be considered as a colourless oil. To remove the last traces of colouring matter from a vegetable oil is much more difficult than the destruction of the rancid odour, and in order to accomplish this completely, it is necessary to subject the refined oil to some mild bleaching action which does not introduce harmful ingredients which would be difficult of subsequent removal. Of the many well-known methods of bleaching proposed for general use, the use of hydrogen peroxide seems to be most favourable in this regard, as it is easy of application, and at its present price is not prohibitive. Sufficient dilute alkali should be added to neutralize any mineral acid it may contain, and a slight excess of alkali favours the action of the hydrogen peroxide, at the same time having no saponifying action. Next in order of suit-ability is a dilute solution of chloride of lime slightly acidified with acetic acid. If the addition of acid and the temperature of the bleaching are carefully controlled, the chance of injury to the oil by free chlorine is a minimum, and the result is a pure water-white product.

COWPEAS AND OTHER SOIL-RENOVATING CROPS.

Farmers' Bulletin 319 of the United States Department of Agriculture contains the following note on the value of cowpeas and other leguminous crops, not only on account of the actual yield obtained, but also through the soil-renovating influence of these crops:—

Corn requires a strong, well-tilled soil, and upon thin land, deteriorated by bad management, the yield obtained soon drops below a remunerative average. Such lands will, however, profitably produce other crops of great value for the sustenance of farm stock, and, in addition, the growing of these crops will provide an excellent means of soil renovation. Lands that are now producing 10 bushels of corn per acre will, with much less labour, produce 1¼ tons of cowpea hay per acre, equal in nutritive value to 31 bushels of corn; or they will yield 1¼ tons of peanut hay per acre, equal in nutritive value to 23¾ bushels of corn, and in addition a peanut crop of 25 bushels per acre may be secured.

On rich lands that under good culture will produce 40 or more bushels of corn per acre, satisfactory results can be secured by planting cowpeas between the rows of corn. Even rich alluvial soils, estimated to yield 40 bushels of corn per acre, if sown to alfalfa, frequently produce 5 tons of hay per acre in a season, equal in feeding value to 105½ bushels of corn. In addition, such crops as cowpeas, peanuts, and alfalfa rapidly enrich the soil, and leave it in excellent mechanical condition for the ensuing year.

MARKET REPORTS.

London,—August 4, 1908, 'THE WEST INDIA COMMITTEE CIRCULAR

ARROWROOT—Quiet : no quotations.

BALATA—Sheet, 2/- to 2/4 ; block, 1/7½ to 1/8.

BEES'-WAX—Good quality, £7 10s. to £7 15s. per cwt.

CACAO—Trinidad, 59/- to 74/- per cwt.; Grenada, 50/- to 59/- per cwt.

COFFEE—Santos, 26s. per cwt.; Jamaica, no quotations.

COPRA—West Indian, £17 to £17 5s. per ton.

COTTON—St. Vincent, 14*d.* to 15*d.*; Barbados, 14*d.* to 15*d.*; St. Kitt's, 14*d.* to 15*d.*; Montserrat, 14*d.* to 15*d.* per lb.

FRUIT—

- **BANANAS**—Jamaica, 4/6 to 6/- per bunch.
- **LIMES**—Unsaleable.
- **PINE-APPLES**—St. Michael, 2/3 to 4/- each.
- **GRAPE FRUIT**—8/- to 12/- per box.
- **ORANGES**—Jamaica, 9/- to 13/- per box.

FUSTIC—£3 10s. to £4 10s. per ton.

GINGER—Quiet.

HONEY—17s. to 27s. 6*d.* per cwt.

ISINGLASS—West India lump, 10/- to 2/- per lb.; cake, 11*d.* per lb.

LIME JUICE—Raw, 1/2 to 1/4 per gallon; concentrated, £13 10s. per cask of 108 gallons; Distilled oil, 2/5 per lb. ; hand-pressed, 4/6 to 4/7 per lb.

LOGWOOD—£3 10s. to £4 5s. per ton; roots, £2 10s. to £3 10s. per ton.

MACE—Quiet ; no quotations.

NUTMEGS—Quiet.

PIMENTO—Quiet ; 2¼*d.* to 2½*d.*

RUM—Jamaica, 3/- to 8/- ; Demerara, 2/4 to 2/7 per gallon ; Trinidad, no quotations.

SUGAR—Crystals, 15/9 to 16/9 per cwt. ; Muscovado, 16/2½ ; Molasses, no quotations.

New York,—July 24, 1908.—Messrs. GILLESPIE, BROS. & Co.

CACAO—Caracas, 12½c. to 14c. ; Grenada, 12c. to 13½c. ; Trinidad, 12½c. to 14c.; Jamaica, 10c. to 12c. per lb.

COCOA-NUTS—Jamaica, select, $24·00 to $25·00 ; culls, no quotations ; Trinidad, $22·00 to $24·00; culls, $13·00 to $14·00 per M.

COFFEE—Jamaica, ordinary, 7¼c. ; good ordinary, 7¾c. to 8¼c. per lb.

GINGER— 10¾c. to 14c. per lb.

GOAT SKINS—Antigua and Barbados, dry flint, from 48c. to 49c. ; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c., dry flint, per lb.

GRAPE FRUIT—California, no quotations.

LIMES—$3·75 to $4·50 per barrel. Market over-stocked.

MACE—No quotations.

NUTMEGS—110's, 9c. per lb.

ORANGES—California, no quotations.

PIMENTO—4½c. to 4¾c. per lb.

SUGAR—Centrifugals, 96°, 4·25c. Muscovados, 89°, 3·75c. ; Molasses, 89°, 3·50c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. LEACOCK & Co., August 17, 1908; Messrs. T. S. GARRAWAY & Co., August 18, 1908.

ARROWROOT—St. Vincent, $4·00 to $4·10 per 100 lb.

CACAO—Dominica, $15·00 per 100 lb.

COCOA-NUTS—$16·00 per M. for husked nuts.

COFFEE—Jamaica, $8·50 to $10·50 per 100 lb.

HAY—$1·50 per 100 lb.

MANURES—Nitrate of soda, $65·00 ; Ohlendorff's dissolved guano, $55·00 ; Cotton manure, $42·00 ; Cacao manure, $48·00 ; Sulphate of ammonia, $75·00 ; Sulphate of potash, $67·00 per ton.

MOLASSES—No quotations.

ONIONS—Strings, $2·27 per 100 lb.

POTATOS, ENGLISH—$3·40 to $3·50 per 160 lb.

PEAS—Split, $6·25 ; Canada, $3·25 per bag.

RICE—Demerara, $5·46 to $5·90 (180 lb.) ; Patna, $3·80 ; Rangoon, $3·00 per 100 lb.

SUGAR—Muscovado, 89°, $2·05 per 100 lb., package included ; Dark crystals, $2·50 ; Centrifugals, $2·35 to $2·75 per 100 lb.

British Guiana,—Messrs. WIETING & RICHTER, August 8, 1908 ; GEORGETOWN CHAMBER OF COMMERCE FORTNIGHTLY MARKET REPORT, August 7, 1908.

ARROWROOT—St. Vincent, $9·50 per 200 lb.

BALATA—Venezuela block, no quotations ; Demerara sheet, 48c. per lb.

CACAO—Native, 13c. to 18c. per lb.

CASSAVA—96c.

CASSAVA STARCH—$9·00 per barrel of 196 lb.

COCOA-NUTS—$12·00 to $16·00 per M.

COFFEE—Creole, 12c. to 13c. ; Jamaica, no quotations.

DHAL—$6·00 per bag of 168 lb.

EDDOS—84c. to $1·08 per barrel.

MOLASSES—Yellow, no quotations; Dark, no quotations.

ONIONS—Madeira, 3½c. per lb. ; Lisbon, no quotations ; Dutch, 2½c. per lb.

PLANTAINS—16c. to 36c. per bunch.

POTATOS,—English, $1·90 per barrel.

POTATOS, SWEET—Barbados, $1·80 per bag.

RICE—Ballam, $6·40 ; Creole, $5·50 to $5·60 for good ; Seeta, $6·00.

SPLIT PEAS—$6·25 per bag (210 lb.); Lisbon, $4·50.

TANNIAS—$1·20 to $1·32 per bag.

YAMS—White, $2·16 ; Buck, $2·40 per bag.

SUGAR—Dark crystals, $2·50 to $2·75 ; Yellow, $3·40 ; White, $3·70 to $4·60 ; Molasses, $2·25 per 100 lb. (retail).

TIMBER—Greenheart, 32c. to 55c. per cubic foot.

WALLABA SHINGLES—$3·50 to $5·75 per M.

——**CORDWOOD**—$2·40 to $2·64 per ton.

Trinidad,—August 8, 1908.—Messrs. GORDON, GRANT & Co.

CACAO—$12·75 to $13·50 per fanega.

COCOA-NUTS—No quotations.

COCOA-NUT OIL—55c. per Imperial gallon, cask included.

COFFEE—Venezuelan, 8½c. to 9c. per lb.

COPRA—$2·75 to $2·90 per 100 lb.

DHAL—$4·70 to $4·80 per 2-bushel bag.

ONIONS—$1·50 to $1·60 per 100 lb. (retail).

POTATOS, ENGLISH—$1·50 to $1·60 per 100 lb.

RICE—Yellow, $5·40 to $5·75; White, $4·75 to $5·85 per bag.

SPLIT PEAS—$5·85 to $6·00 per bag.

SUGAR—American crushed, $5·00 to $5·10 per 100 lb.

AGRICULTURAL NEWS.

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Fungus Diseases of Cacao.

THE fungus diseases of cacao have received considerable attention of late years in the West Indies. When it is remembered that cacao comes second in importance to sugar among West Indian products, and that the exports for 1907-8 were valued at over £2,000,000, the necessity of taking every possible measure to eradicate the various diseases that threaten to reduce the value of the industry is at once apparent.

At the West Indian Agricultural Conference held at Barbados in January last, the whole question of fungus diseases on cacao in the West Indies, etc., together with the methods that should be adopted in the management and sanitation of cacao orchards, so as to prevent the occurrence of diseases, was dealt with in a paper read by Mr. F. A. Stockdale, B.A., F.L.S., Mycologist on the staff of the Imperial Department of Agriculture. This paper has been published in the *West Indian Bulletin* (Vol. IX, No.2), and it has also been issued in booklet form, as *No. 54* in the Pamphlet Series of the Department (price 4*d.*, post free 5*d.*).

Canker and root disease are the most destructive among the parasitic diseases affecting cacao in the West Indies, and these have been carefully investigated. Die-back, brown pod rot, and black pod rot have also received considerable attention, and there are at present several other diseases under investigation.

Canker is a branch or stem disease, which occurs more frequently among old trees than among young ones. It may be caused by several fungi that have been shown to be wound parasites. The existence of the disease may be noticed from the change in appearance of the bark at affected spots. The best time to look for these areas would appear to be in the dry season, immediately after a shower of rain, for the greyish-brown, affected areas do not dry as quickly as the unaffected portions of the bark. When the disease is fully established the bark presents a deep claret colouration on being cut, and is moist and soft to the touch. The outermost layers of wood are also affected. Canker spreads rapidly through the bark of a tree, Branches frequently die through having become 'ringed,' while not uncommonly whole trees are killed, especially when the diseased area is near the surface of the ground.

In plantations where canker has become established, remedial measures should be thoroughly carried out. Dead trees and all dead branches should be removed and burned. Where canker spots exist on branches and stems, the diseased bark and wood should be cut away with a sharp knife, and afterwards burned. It is important that all the wounds thus caused, and all other wounds on cacao trees in the neighbourhood should be cleaned and thoroughly dressed with tar, or some other similar fungus-proof dressing.

Root disease attacks the roots of cacao trees, as well as of pois doux, bread-fruit, bread nut, avocado pear, etc. If allowed to run its course unchecked, the disease causes the death of the affected trees. As in the case of canker, all trees in the cacao plantation that have died of the disease should be removed and burned, and special care should be taken to extract every portion of the roots.

When an area of cacao is seen to be affected, a circumscribing trench should be dug to isolate it from the remainder of the field. The most badly diseased trees should be removed, all the roots being dug out. In the case of other trees less badly affected, the roots should be laid bare by the removal of the soil, and all diseased roots be cut out and burned. Lime should then be applied around the roots of the tree, and after the soil has been replaced, and the whole of the infected area well forked, a good application of quick lime should be broadcasted over the land. The health of the trees will be promoted by dressings of pen manure, and by mulchings given some time later, and in the following year a second application of lime, in about half the quantity, should be given.

The susceptibility of bread-fruit, bread nut and other trees to attacks of the fungus responsible for root disease of cacao would suggest that these trees should be excluded from all new plantations of cacao. All such trees, in old established orchards, which show any signs of disease should be taken out and burned, and when any are cut down care should be taken to extract and destroy all the roots.

Several other fungus diseases are dealt with, and methods of treatment indicated. Among these diseases may be mentioned those known as die-back, Lasiodiplodia, pink disease, witch broom, brown rot and black rot of pods, scabby pod, etc. Die-back has been noticeable particularly in St. Lucia, but it can be practically eradicated by high cultivation, manuring, suitable pruning, etc. 'Pink' disease' is known in Dominica and has also been noticed in St. Lucia. It does not appear to be serious in itself, but since its presence causes cracks in the branches of affected trees, by which the spores of other fungi may gain entrance, it may easily be the forerunner of more serious diseases.

Both the brown rot and the black rot of pods have been responsible for a good deal of damage among cacao plantations in various islands. Brown rot is due to the same fungus—*Diplodia cacaoicola*—which causes the die-back disease of the stem. The gathering of diseased pods, together with the collection of husks and shells, and their subsequent burial with lime, is a measure that should receive first attention on the appearance of either brown or black rot, since experience has shown that this is a valuable means of checking the disease.

During the past ten years much useful work has been done in the West Indies in investigating the fungus diseases of cacao, and the best methods of treatment. In this, the successive Mycologists attached to the Imperial Department of Agriculture have been largely instrumental, while officers of the Department stationed in the several cacao-growing islands have also given useful assistance. Recently Mr. O. W. Barrett of the United States Department of Agriculture was specially engaged by the Government of Trinidad for a period of five months studying the fungus diseases affecting cacao in that colony, and he has issued several reports. With the fuller knowledge of the subject, acquired as the result of the above work, it may be stated that practically all the different fungus diseases of cacao are amenable to treatment, and by the adoption of proper methods may rapidly be reduced to a minimum.

The attention of planters is particularly drawn to the latter section of the pamphlet which deals with the Sanitation of Cacao Orchards, since in it they will find a good deal of matter well worthy of their consideration. The importance of thorough and careful cultivation as a means of warding off diseases is emphasized, and it is pointed out that expenditure on tillage, drainage, and judicious manuring is repaid by the improved condition of the trees, and by the increased yield. Various cultural and other operations, such as pruning, the treatment of wounds, protection from wind, provision of shade, etc. are also briefly discussed in so far as they may have an influence in maintaining the health of the trees and in preventing the appearance and spread of disease.

SUGAR INDUSTRY.

Seedling Canes D. 74 and D. 95 in Louisiana.

It is well known that the Demerara seedlings D. 74 and D. 95 have been cultivated for several years by many different planters in Louisiana, and varying reports as to the returns obtained from these canes are occasionally published.

Of the two seedlings, D. 74 it appears, has of late gained much in favour at the expense of D. 95. This is so much the case that the *Sugar Planters' Journal* of August 15 contains a brief article, comparing the two canes, and drawing attention to the merits of D. 95, which during the past season has been grown on only a very limited scale. The objection which, it is stated, is being urged against this latter cane by many planters is that it requires richer land and more heavy manuring for a given return, than are needed by D. 74.

With regard to D. 74, on the other hand, it is pointed out that some planters have of late complained that it does not grow thickly enough to shade the soil well, with the result that grasses and other weeds give much trouble between the rows. On account of the brittle nature of the cane, too, there is a danger of loss from breaking off the tops of stalks if weeding implements are passed between the rows after the canes have attained a certain height.

On behalf of D. 95, it is urged that no such complaint as this can be made against it, since it possesses the advantages that it shades the soil well, it is not brittle and liable to break at the top, but is well fitted to withstand wind and storm. In a crop report from Plaquemines, which appears in another part of the *Journal*, the manager of a large plantation is reported as having said that of the two Demerara seedlings he was inclined to favour D.95 as an all-round cane, on account of the above advantages, and because it gave better returns on land deficient in drainage.

Labour and Irrigation on Hawaiian Sugar-cane Estates.

Reports from the Hawaiian Islands all testify to the fact that the cane crop season of 1907-8 has been a very prosperous one. The crop yields actually obtained have exceeded the estimates, and prices have continued satisfactory through the season. The most recent estimates place the entire sugar crop of the islands at about 500,000 tons, as compared with 390,000 tons in 1906-7.

The Hawaiian correspondent of the *American Sugar Industry and Beet Sugar Gazette* states that the question of the best method of dealing with labourers on the sugar plantations is receiving a good deal of attention in Hawaii. The actual rate of remuneration which the labourers are to receive does not form the question under debate, but it is the manner in which this wage or remuneration shall be paid, so as to be most satisfactory to the labourers themselves, and also result in the most effective cultivation and best returns to plantations, which is under experimental consideration.

As far as the white labourers are concerned a good deal has been done to make it possible for them to secure homesteads of their own, with a small amount of tillage land attached, so that they will be able to add to their income, or provide part of the provisions required for their family from their own gardens, while working on the plantations for money wages. On one large plantation about seventy families have each been enabled to secure about 5 acres of land from the Government, and these small areas are utilized for the cultivation of pine-apples. A pine-apple cannery has been built, and the pine-apples raised by these small cultivators are purchased at a given rate.

Other plantations have started an arrangement under which a certain specified area of land is given to a group of labourers to be cultivated with sugar-cane, the plantations buying the cane at maturity on a sliding scale of prices varying with the price of sugar. The figure paid for the labourers' canes varies from $2·50 when the price of sugar on the New York Market is 3c. per lb. to $3·50 per ton when sugar in New York is selling at 4c. per lb.

Irrigation is carried out on a considerable scale on the sugar-cane lands of the Hawaiian Islands, more especially in Maui. In this latter island, various irrigation works which were previously under the direction of different authorities have recently been brought under the control of one corporation. This arrangement should result in less wastage and more efficiency, and should assist towards the further development of the sugar-cane industry of the island.

Sugar Industry in Egypt.

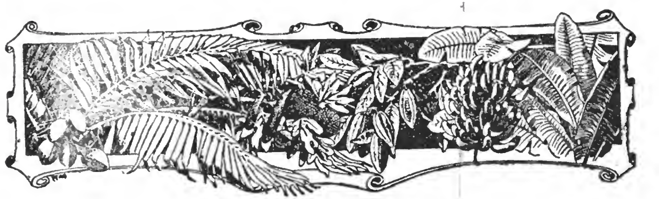
A large amount of general and statistical information as to the growth of the sugar industry in Egypt, and its present financial condition is contained in a report lately issued by the United States Consul at Cairo.

Sugar-cane cultivation began in Egypt in 1850, the cane having been brought from Jamaica. The manufacture of sugar, however, was not started until 1855. Cotton was at a low price at the time, and this gave a considerable impetus to sugar-cane cultivation. For some years the sugar industry was in the hands of a Government Commission, which erected a number of factories.

The Egyptian sugar trade is now principally monopolised by a French company known as the Société Générale des Sucréries. At the start—in 1905—the operations of this company did not flourish, partly owing to the fact that the high price obtained for cotton was instrumental in reducing the sugar-cane acreage. During 1906 the area devoted to sugar-cane cultivation fell off to the extent of 50 per cent. In that year the Société Générale des Sucréries was re-organized, and is now in a more favourable position. It practically has the whole sugar industry of Egypt in its hands, although only four factories are now working. These factories not only manufacture, but also refine the sugar.

In 1905-6 the company dealt with 684,608 tons of cane, and turned out 63,634 tons of raw, and 46,619 tons of refined sugar. In 1906-7 the quantity of canes handled fell to 414,877 tons, from which 41,509 tons of raw, and 31,144 tons of refined sugar were turned out. The average sucrose content of the Egyptian canes was 12·34 in 1905-6, and 12·70 in 1906-7. The cost of manufacture is stated to have been $5·00 per 220 lb. in 1905-6 and $5·04 in 1906-7, the advance being due to the increased price of raw sugar, and to higher cost of labour.

All the sugar exported from Egypt is in the refined state. In 1906 refined sugar to the value of $215,995 was shipped, but in 1907, the value of the exports fell to $185,355. This decline is stated to be due to increased domestic consumption. The quantity of sugar produced in Egypt, however, is far from being sufficient to supply the local demand, since in 1907 the imports of this article reached 23,500 tons, valued at $1,389,534. By far the greater quantity of these consist of beet sugar, imported from Austria.



WEST INDIAN FRUIT.

BANANA INDUSTRY IN SURINAM.

As the result of an agreement contracted some two years ago between the Government of Dutch Guiana and the planters of that colony on the one hand, and the United Fruit Company on the other, a banana industry has been started in the colony, and increasing shipments of fruit have been made during the past five months.

Under the above agreement the planters of Surinam agreed to plant, in 1907, an area of 2,470 acres with bananas, and by the end of 1909, to increase this area to at least 7,410 acres. The Government of the colony undertook to advance the funds which were necessary to assist in starting the industry, this money to be repaid in instalments as the plantations came into bearing. It has been estimated that the total sum required from the Government for the purpose of planting and bringing into cultivation of the 7,410 acres mentioned, will amount to very nearly £150,000, or approximately £20 per acre.

For every 20,000 bunches of bananas produced, the United Fruit Company undertook on its part, to send a boat to Dutch Guiana, to fetch away the produce.

Arrangements have been made for the importation of coolies from India to provide the necessary additional labour required by this new industry, and a small tax is to be placed upon the proceeds of the banana plantations in order to meet the expense of this importation.

The industry has every promise of success in the future, but one or two difficulties that have presented themselves so far are dealt with in an article appearing in a late number of the *Journal d' Agriculture Tropicale.* It is explained that when the scheme was started it was understood that the banana plantations would, in the great majority of cases, be made on cacao estates of the colony, where they would form a subsidiary cultivation. Many large cacao planters, however, found themselves unable to give time and attention to bananas as well, and hence large plantations have been started which are devoted to banana culture only. The result has been that the initial expenses connected with the start of the industry have been heavier than was expected, and the return of the Government advances must necessarily be delayed.

A second difficulty is connected with the expense of transport of the bananas from the plantations to the steamers. The banana areas lie chiefly along the Surinam river, and it is estimated that the construction and maintenance of a wharf, the provision of lighters, oarsmen, etc., would entail a cost of £4 per acre per annum, if each estate undertook to convey its own produce to the steamers. Alternative ideas that have been put forward are that a light railway might be constructed along the valley of the Surinam river, or that the United Fruit Company should provide a common service of lighters towards which all the estates would contribute. The latter is the more favoured suggestion, since the construction of a railway would necessarily entail another heavy initial expense on the developing industry.

THE COMING COLONIAL FRUIT SHOW.

Attention is drawn to the letter given below, which has been received from Mr. A. E. Aspinall, the Secretary to the West India Committee, in relation to the show of colonial-grown fruit and vegetables that will be held at Westminster at the end of November next. The season is a favourable one so far as the West Indies are concerned, since at that time of the year, fine collections of produce will be available in these islands, and it is greatly hoped that a general effort will be made by the Permanent Exhibition Committees of the several colonies to co-operate with Mr. Aspinall, and that dealers and consumers in London will be enabled to see really creditable displays of fruit and vegetables from the West Indies.

Mr. Aspinall writes:—

'Will you permit me to avail myself of the columns of the *Agricultural News* for the purpose of calling the attention of the various Permanent Exhibition Committees in the West Indies to the Colonial Fruit Show to be held at the Royal Horticultural Hall, Westminster, on November 26 and 27 next. Trinidad and Montserrat have already decided to participate, and we hope on this occasion to make a really characteristic display of West Indian fruits, preserves, etc. The Royal Mail Steam Packet Company have kindly consented to carry exhibits 'freight free,' and the only expenditure will be that for staging the exhibits, carriage of fruit from Southampton or Avonmouth, as the case may be, and incidental expenses.

'It is very important that we should know as soon as possible which of the colonies decide to take part in this exhibition; and I trust you will help our efforts to arrange for an exhibit which will do full credit to our West Indian Colonies. . . .

'In conclusion, I would remind the Permanent Exhibition Committees that the exhibits should be addressed to me at the Royal Horticultural Hall, Westminster, and be accompanied with a complete list, together with suitable matter for publication in leaflet form.'

RETURN FROM GRAFTED CACAO TREES.

In further reference to the subject of grafted cacao at Dominica, concerning which one or two short articles and illustrations have lately been given in the *Agricultural News* (see Vol. VII, pp. 197, 213), the accompanying illustration (Fig. 13), prepared from a photograph forwarded by Mr. Joseph Jones, Curator of the Dominica Botanic Station, should be of interest. The picture represents the first gathering of pods from seven grafted Alligator cacao (*Theobroma pentagona*) trees growing at the Station. At the time of picking the pods, the trees were two years and nine months old. When those had been gathered there still remained on the seven trees a total of 134 pods, or an average of nineteen pods per tree, which ripened in the course of a few weeks following.

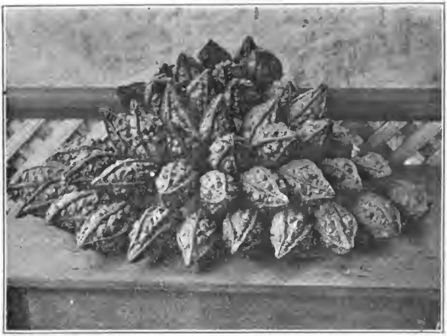


Fig. 13. Cacao Pods from Grafted Trees 2¾ Years Old.

FEEDING COTTON-SEED MEAL TO HOGS.

In a booklet (*No. 43 Pamphlet Series*) issued some two years ago by the Imperial Department of Agriculture, the question of the use of cotton-seed and cotton-cake meal as a feeding-stuff on West Indian estates was dealt with. The principles of rational feeding—based upon a knowledge of the requirements of the animal body, and the chemical constituents of food-stuffs—were explained, and several rations, suitable for mules and oxen, and which contained cotton-seed or cotton-cake meal, mixed in due proportion with other foods, were indicated.

As a food for hogs cotton-seed meal has not been regarded with favour in the past. This is due to the fact that if fed in any but small quantity, the health of the animals has suffered, and when an excess of the meal has been continuously given, it has, not infrequently, resulted in the death of the pigs.

The question of rations for hogs in which cotton-seed meal shall be included is discussed in a lengthy article appearing in a late number of the *Southern Planter*. Recent experimental work dealing with the subject is reviewed and the conclusion arrived at is that although much has still to be learned on the question, yet it is evident that, if given in small quantity only, and mixed with much larger proportions of other food-stuffs, such as corn, cotton-seed meal forms a valuable addition to the list of foods available for pig fattening in countries where cotton seed is produced.

Maize is the chief hog food in many countries, but, as is pointed out in the above-mentioned article, this is an unsatisfactory food when used alone, owing to the excessive proportion it contains of starchy material, and the small proportions both of albuminoids or flesh-forming constituents, and of mineral constituents which enter so largely into the building of bone, and are therefore necessary for young and growing animals.

In some feeding trials carried out in the United States and referred to in the article mentioned, some young pigs fed on corn alone made only 8·2 ℔. of gain per bushel of corn consumed. When a due proportion of a food rich in albuminous matter, such as skim milk, bran, or linseed meal was added, slightly over 20 ℔. of live weight was put on per bushel of corn consumed.

Cotton-seed meal contains a very much smaller quantity of carbohydrates than maize, weight for weight, but contains about twice as much digestible albuminoid matter. Recent experiments tend to show that the bad results which have frequently followed the use of this material with hogs are in all probability due to feeding in too large a quantity, or feeding continuously for too long a time.

For animals which are being fattened it would seem advisable that not more than one-fifth of the ration given should consist of cotton-seed meal. This amount should not be given continuously for more than fifty days, and at the end of that time, the proportion of the meal might advisably be reduced to one-eighth of the total ration. Experiments carried out in Arkansas showed that small hogs of 50 ℔. weight might advantageously receive ¼ ℔. of cotton-seed meal per day; animals between 50 and 75 ℔. could be given ⅓ ℔.; between 75 and 100 ℔., ⅖ ℔., while ½ ℔. of meal per head per day could be given to animals weighing over 100 ℔. These quantities were fed to the animals daily for from 156 to 186 days with good results. In some cases the pigs were fed during this period on a ration containing over ¾ ℔. of cotton-seed meal per head per day, but it is stated that this quantity is probably rather more than can be given regularly with safety.

The amounts of cotton-seed meal mentioned are small, but the nutritive value of a ration consisting chiefly of maize meal is much improved by the inclusion of even this small quantity of an albuminous material.

COTTON NOTES.

WEST INDIAN COTTON ON THE LIVERPOOL MARKET.

Messrs. Wolstenholme & Holland, of Liverpool write as follows, under date of August 17 last, with reference to the sales of West Indian Sea Island cotton on the Liverpool market:—

There has been a moderate enquiry for West Indian Sea Island cotton since our last report. This has resulted in the sales of about 130 bales, comprising Barbados, St. Kitt's, St. Croix, and St. Martin, principally at 14*d.* to 15*d.*, with a few bales at 16*d.* It will be seen, therefore, that prices are without change.

COTTON PLANTING MACHINES.

The following article dealing with the use of machines in planting Sea Island cotton has been contributed by Mr. Thomas Thornton, A.R.C.S., late Travelling Inspector in connexion with Cotton Investigations under the Imperial Department of Agriculture:—

The introduction of machinery to take the place of hand labour and to cheapen the cost of production is occurring as rapidly in connexion with agriculture as with other industries, and it is important that agriculturists should make themselves acquainted with the latest labour-saving implements on the market.

Growers of Sea Island cotton in the West Indies have to compete with producers in the Southern States of America, where a large part of the planting and cultivation work is carried out by means of machinery which saves both labour and expense. Labour, it is true, is not so costly in the West Indies as in the States, but complaints are heard in many of the islands that labour is scarce, while in cases where there is no lack of men, the labourers are frequently unreliable and the work is done in an unsatisfactory manner.

Cotton and other seeds have, so far, in these colonies been planted almost exclusively by hand, but at the present time there are several simple machines on the market for carrying out this work.

The land is of course prepared in the same manner whether the cotton is planted by means of the machine or by hand, but nevertheless the planting machine is one of the most useful implements that could be procured for a cotton estate, and well repays the investment made. The machine may also be used for planting other seeds, such as maize or sorghum, as well as cotton.

Sometime ago I imported for use on my estate in Tobago a cotton and corn planter (Averys' 'Sod Planter'), and since one or two slight alterations have been made, this machine has given every satisfaction. It is light in draught, so that a pony can draw it with ease, and by its means as much as 8 acres of land can be planted per day.

The machine is provided with an 'opener,' which fits into the ground, and makes the furrow in which the seed is planted. By suitable means, too, the seed is dropped from the machine, in proper amount, into this small furrow, while by means of two large spoon-like arrangements, passing near the surface of the ground, the mould is drawn over the seed in the furrow. Behind these there is a broad wheel with a concave rim which presses down the mould over the seeds.

The machine does excellent work when the soil is in a dry condition. After rain, however, when the soil is in a sticky condition, the implement is apt to become clogged. The opening through which the seed passes to the ground becomes choked up with mould, which prevents the seed from passing through. This, however, can be remedied, and experience has shown that if the 'opener' be removed, and replaced by a pointed shovel, and the press wheel at the back be also taken away, the machine works well, even in a sticky place and immediately after a shower.

Besides the 'Sod Planter,' the firm of B. F. Avery & Sons make a second machine, known as the 'Uncle Sam' cotton and corn planter, which is almost identical with the 'Sod Planter,' when the alterations mentioned above have been made.

In such islands as St. Vincent and St. Kitt's, the 'Sod Planter' would do good work; but in Barbados, Antigua, Montserrat and Tobago, the 'Uncle Sam' planter will probably be found most satisfactory.

These machines plant in straight rows only, or as straight as a horse can be guided. Cotton seed can be planted in a continuous drill, the quantity of seed dropped being regulated by a thin feed-slide. If the seed is delinted, it may be planted with corn plates, which drop the seed at regular intervals, three or four seeds being planted at each hole. The depth at which the seeds are planted can also be accurately adjusted.

The price of these planting machines in America is $12 each.

Cotton in the Sea Islands. Messrs. Henry Frost & Co., of Charleston, writing on August 8 last, state that the market for cotton from the Sea Islands was dull and with no demand. The stock in hand consisted of about 100 bales, chiefly of 'Fully Fine' quality, for which planters were asking 30c. per lb.

With regard to the crop of the coming season, the much needed rain had occurred around Charleston, and in that district prospects are favourable. From Beaufort the reports received are not so good, and the outlook in that section is not so promising. Reports still speak of a reduction in the acreage under Sea Island cotton.

PRISON FARMS IN BRITISH GUIANA.

A farm is worked in connexion with most of the prisons in British Guiana, and this not only assists in making the institutions self-supporting by providing remunerative labour for the prisoners, but should further serve a useful purpose in training the men concerned to a knowledge of agricultural work according to the best methods. The following particulars in regard to the farm worked in connexion with the Suddie prison are from a late number of the *Demerara Argosy*:—

Early in 1906, a farm of 25 acres was started at the Suddie prison in order to find employment for the prisoners. A large amount of work had to be done before the land was clear and ready for the spade of the cultivator.

Plantains and sweet potatos were planted, but, on the advice of Professor Harrison, Director of Science and Agriculture, who has stated that the greater part of the land is not suitable for plantains, it has been decided to go in principally for rice and potatos. The question of a water supply, so essential for the rice crop, at one time threatened to put an obstacle in the way of this project, but this has been overcome by improving and extending for a considerable distance a trench which now leads to a sand reef. A series of small reservoirs has been made, and from these a constant supply of water is obtained, the trench serving to carry it to the rice beds, which can be flooded at will, and also, by an ingenious contrivance of stop-offs, acting as a drainage trench. Besides rice, cassava, sweet potatos and ochros are grown here, and in the course of a month or two every bit of the 25 acres forming the farm will be under cultivation. As showing the progress made, it may be stated that during the half-year ending November last, 1,972 lb. of sweet potatos were obtained from the farm, but during the six months ending May, the crop amounted to no less than 8,600 lb. So it was with the other articles. The cassava crop during the last six months came to 2,037 lb., against 553 lb. in the preceding six months. Last half-year 113 bags of paddy were disposed of and there were 120 bags on hand; while in the preceding period 116 bags were sold and 75 remained on hand.

SOIL MOISTURE AND HUMUS.

Dealing with methods of improving the condition of land in a low state of fertility, *Farmers' Bulletin 245* of the United States Department of Agriculture, entitled 'The Renovation of Worn-out Soils,' has the following passage on the importance of maintaining a proper supply of humus in the soil:—

In producing sufficient grass to yield a ton of dry hay on an acre of land, a quantity of water approximating to 500 tons is withdrawn from the soil by the grass. In order to supply this enormous quantity the land must not only be in condition to absorb and hold water well, but it must be porous enough to permit water to pass freely through the soil. The presence of large quantities of decaying organic matter (humus) adds enormously to the water-holding capacity of the soil. One ton of humus will absorb 2 tons of water and give it up readily to growing crops. Not only that, but the shrinkage of the particles of decaying organic matter and the consequent loosening of soil grains keep the soil open and porous.

Furthermore, humus of good quality is exceedingly rich in both nitrogen and mineral plant food. The maintenance of fertility may almost be said to consist in keeping the soil well supplied with humus. The first step in renovating worn-out soils is to give them an abundant supply of humus of good quality. Perhaps the best source of humus is stable manure containing both the liquid and the soil excrement, especially when the stock are fed rich on nitrogenous foods. Even a poor quality of barnyard manure, which has had much of the plant food leached out of it, has considerable value because of the humus it makes.

Another cheap and valuable source of humus, but one which must be used with judgement, is the use of green crops grown to be ploughed under as manure. The legumes such as cowpeas, woolly pyrol, Bengal beans, and velvet beans are especially valuable for this purpose, because of the nitrogen they contain; but other crops, such as rye, and even corn sown thickly may sometimes be made to supply large quantities of humus of fair quality

COCOA-NUT PLANTING IN SAMOA.

Copra forms by far the most important article of export from the Samoan Islands at present, although the shipments of 1907 (5,400 tons, valued at £77,981) fell far below those of the previous year. The price of the product, too, fell from £17 per ton in 1906 to £12 in 1907. Notwithstanding this, the British Consul at Samoa states that owners of land suitable for cocoa-nut cultivation are paying increasing attention to the industry, and the Government of the islands have for some years past required that each Samoan family shall plant at least fifty cocoa-nuts yearly on their land.

The following notes are taken from the latest report of the British Consul at Samoa:—

It is recommended that the holes in which the cocoa-nuts are to be planted should be about 2 feet deep and correspondingly wide, and that they should be filled with a mixture of good soil and compost, ashes, a little salt, and, in cases where the soil lacks lime, some coral sand. The nuts should be covered with at least 3 or 4 inches of soil and not be closer together than 33 feet, or about forty to the acre, or in the immediate neighbourhood of the sea they may be 30 feet apart.

The crucial point is for the trees to have light and air on all sides, otherwise they will not bear well. Where forest trees are left standing in their neighbourhood, the growth of the cocoa-nut palms is much retarded and the yield lessened, and when even orange and other fruit trees overgrow and overshadow them, they do not thrive. According to the experience of some planters, trees growing one or two miles from the sea have a much smaller yield than those growing close to it, although this may not everywhere be the case.

It is stated by the authority mentioned above that the upward growth of the cocoa-nut palm in Samoa appears to be slower than in the coral islands of the South Seas, and especially New Guinea. But in place of this it appears to attain a greater age in Samoa, with unaltered yield. I was shown palms by one of the oldest planters in Samoa, which were still in full bearing, although they were reputed to be eighty years old. Such trees may certainly attain an age of a hundred years. The crowns of the palms in Samoa appear to me to be richer in leaves and much more compact than those of several parts of Kaiser Wilhelmsland.

The full-grown cocoa-nut plant is a bad neighbour to other plants, as its root system is uncommonly strong.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial of the present issue discusses the chief fungus diseases affecting cacao in the West Indies, and gives some hints as to remedial treatment.

Information with regard to the position of the sugar industry in Hawaii and in Egypt, and to conditions which influence its progress in these countries, will be found on page 275.

A Colonial Fruit Show is to be held in London in November next, in which it is hoped the West Indies will participate (page 276).

A brief note, with illustration, appearing on page 277, and relating to the return that has been obtained from grafted cacao trees at Dominica, should be of interest to cacao planters.

The attention of cotton planters is drawn to the article on cotton-planting machines that will be found on page 278.

Some interesting observations with regard to the occurrences of certain insects on cacao trees at Trinidad, together with a note on 'jumping seeds,' are recorded under Insect Notes (page 282).

The chief conditions favourable to the development of nitrogen-assimilating bacteria in the soil are dealt with in an article appearing on page 283.

Increasing yield of Balata.

The output of balata (the produce of *Mimusops globosa*) has shown a steady increase in British and Dutch Guiana, and in Venezuela for many years past.

In 1887 —twenty years ago—British Guiana exported 80,942 lb. of balata and Dutch Guiana 1,093 lb., while there were then no exports from Venezuela. Ten years later there were 332.262 lb. exported from British Guiana, 434,000 lb. from Dutch Guiana, and 165,000 lb. from Venezuela. The increase in the output during the past six or seven years has been more noticeable in Venezuela and British Guiana than in Dutch Guiana. British Guiana in 1903 shipped 743,553 lb., and in 1907, 987,225 lb. In the last-named year Venezuela exported 3,203,141 lb. and Dutch Guiana 765,120 lb. So far balata has only been shipped in trivial quantity from French Guiana, although the tree which produces it is found growing in quantity in the colony.

Zapupe Fibre Plant.

An article dealing with the rapid extension that has of late years taken place in the cultivation of the 'zapupe' fibre plant in Mexico was given in the *Agricultural News* of April 18 last (page 125). Within a period of two or three years after the cultivation had started, no less than 4,000 or 5,000 acres were devoted to the growth of the fibre plants, and the industry is reported to be a remarkably remunerative one.

The specific identity of the 'zapupe' has not yet been established, but so far it has been considered to be a species of *Agave.* In the course of an article contributed to the *Tropenpflanzer* of April last, however, Dr. Endlicher states that his observations lead him to believe that, as in the case of 'ixtle,' the 'zapupe' fibre is probably produced from more than one species of plant, and it seems likely that the chief plant from which it is obtained belongs to the natural order Bromeliaceae, and is not a species of *Agave.*

Trade of Trinidad.

One or two notes from the large mass of statistical information published in the *Annual Report* (1907-8) of the Collector of Customs for Trinidad may be of interest. The value of the produce exported from the colony during the year amounted to £2,612,801, an increase of £1,056,757 as compared with 1906-7, and of £890,896 over the export returns of 1905-6.

The total quantity of cacao shipped from the island during the year was 58,704,352 lb., valued at £2,114,276, as compared with 33,129,152 lb., of the value of £972,169, shipped in 1906-7. Of the above quantity, 49,730,576 lb. were the produce of the colony. Sugar was exported during the year to the quantity of 46,720 tons, valued at £521,051, as compared with 45,004 tons of a value of £430,182 shipped in 1906-7.

The returns show a noteworthy increase in the exports of local produce to Canada. In the case of sugar this increase amounted to £46,665, of cacao to £10,560, and of molasses to £3,845, compared with the figures of the previous year.

Cotton Cultivation in Cuba.

Since 1903, cotton cultivation has been tried in an experimental way by several planters in Cuba, and the soil and climatic conditions which exist in many parts of the island have been found to be eminently suited to the crop. Sea Island cotton is reported to have done excellently well, and one or two Upland varieties (Excelsior, King, Sunflower, and Russell) have also given good results.

The cotton crop in Cuba is, however, subject to the ravages of the cotton boll weevil (*Anthonomus grandis*) which is responsible for such enormous destruction every year in the United States, and this has been a chief cause in preventing the possible development of the industry. Fortunately the boll weevil has not been known to occur in the British West Indies.

◆

Coffee in Porto Rico.

Coffee production in past years formed the premier industry of Porto Rico, but owing to the rapid advances that have of late been made in the output of sugar and tobacco, and also on account of the fact that coffee is not accorded that preference on the United States market which is given to the other two products, the coffee industry of the island has diminished in importance.

It is estimated that there are now some 16,000 coffee plantations, of various sizes, in existence in Porto Rico. These are all situated in the mountainous districts and comprise a total area of about 19,000 acres.

During the year 1907 over 38,000,000 lb. of coffee, of a total value of £934,295, were exported from the island, of which only 185,959 lb. went to the United States.

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Rubber Planting in Samoa.

Rubber planting has of late begun to receive attention in the German colony of Samoa, of which copra has been the chief agricultural product in the past, while cacao production is also a developing industry.

According to the British Consul at Samoa there are three large rubber plantations now in existence in the islands, the largest of which extends to several thousand acres. The remaining two estates are each about 450 acres in extent, and are partly planted in mixed cultivations of rubber and cacao and partly in rubber alone. Para rubber (*Hevea brasiliensis*) is by far the chief variety planted.

Para rubber plants have been imported from Ceylon, and one importation of 100,000 plants was a complete success as regards the subsequent growth of the plants. The Para rubber trees are planted about 15 feet apart each way, and since this tree is liable to destruction by storms on account of its superficial rooting system, it is proposed to protect the plantations with wind-breaks of *Ficus elastica* trees, which, owing to their thick and spreading crown of foliage and strong root system, are well adapted for this purpose.

Pine-apple Industry in Queensland.

Reports from Queensland state that pine-apple cultivation and the subsequent canning of the fruit form a very profitable industry in the colony. The pine-apple acreage is increasing annually, and many trials were made in the hope of establishing an export trade in the fresh fruit to London and other markets. Various modes of treatment were adopted, but in spite of every precaution, the results were unsatisfactory, since it was found on arrival in London that the flavour of the pines had been lost, and on exposure to the air the fruit became flaccid and rotten.

Last year it was estimated that the number of pine-apples produced in Queensland amounted to 650,000 dozen, and since this greatly exceeds the demand—not only of Queensland, but also of the other Australian states as well—for the fresh fruit, canning factories have lately been started to deal with the surplus, and these promise to become very profitable to the proprietors. The canneries are hoping in the first case to secure the whole of the Australian markets, and they have also begun an export trade to the United Kingdom.

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The Candle-nut Tree.

The candle-nut tree (*Aleurites triloba*) forms the subject of a paper in the *Agricultural Ledger of India*, No. 4, 1907. This tree, which belongs to the natural order Euphorbiaceae, is not uncommon in the West Indies, and in Jamaica is known as the 'country walnut.' The countries in which it is found growing in largest quantity, however, are Java, Sumatra, the Moluccas, and South Pacific Islands. It has also been naturalized in many parts of India, and in Madagascar.

The fruit of the candle-nut tree is about the size of a small orange, and usually contains two heart-shaped seeds enclosed within hard shells. The seeds are interesting on account of the fact that they contain about 60 to 66 per cent. of a useful oil, which has a considerable market value. The candle-nut has received its name from the fact that the kernel burns like a candle when a light is applied to it, and in the South Pacific Islands the kernels are threaded on reeds and used as torches.

Of the 60 per cent. of oil contained in the seeds, about 55 per cent. is capable of being readily extracted on a commercial scale. This proportion is very high when compared with other oil-bearing seeds and nuts. Castor oil beans yield no more than 40 to 45 per cent. of oil. The oil expressed from the nuts is known as Bankul oil or artists' oil. It is a drying oil and is used in the arts for the same purpose as linseed oil, viz., in the manufacture of oil-colours, lacquers, and varnishes, and also for soap making. The cake from which the oil has been expressed may be used as a cattle food or a manure.

Samples of candle-nuts have been submitted to brokers in London, who stated that the *kernels* should meet with a ready sale at £12 to £13 per ton.

INSECT NOTES.

The Trinidad *Bulletin of Miscellaneous Information* for July 1908 contains various short notes dealing with observations on several insect pests of cacao, and on a small weevil which inhabits the flower-bud of a certain tree that has now been identified. The accompanying notes, which appear in small type, have been extracted :—

CACAO BEETLE ATTACKS PODS.

On one of the trees at St. Clair a pod was found which appeared to be rotting from the base as if attacked by 'brown rot.' Examination proved that the pod was attacked by the larvae of the common cacao beetle (*Steirastoma depressum*), and that it was feeding principally upon the sweet pulp of the interior. The pod was secured and placed under observation. It was noted that the larvae, after destroying the pulp, attacked the seeds, which had begun sprouting, and devoured more than 75 per cent. of the number in the pod. The larvae ultimately developed into the imago form which enabled the insects to be determined.

As at times insects change their habits, and from one food take up another, it is seen what a serious matter it would be, if pods were generally attacked by the beetle, and planters should be most careful to keep the pests under control by every means in their power.

The cacao beetle is well known as a borer in the wood and bark of cacao trees, but does not appear to have been previously reported as attacking the pods. This insect—larva and adult—was figured in the last issue of the *Agricultural News*, p. 266.

A BAG-WORM ON CACAO.

One of these curious insects is reported as occurring on cacao at Trinidad, but it is not stated that any serious damage has been done. The bag-worms belong to the Lepidoptera. Although a moth, the adult female is wingless, and lives in the bag or covering during the whole life. The male is provided with wings. In the Lesser Antilles acacia trees are frequently seen on which are several of these large bags. At Montserrat the citrus trees at the Botanic Station have been attacked by bag-worms from time to time. These insects are not often numerous, and can generally be controlled by hand picking or the use of Paris green.

A BEETLE DESTRUCTIVE TO THE CACAO TREE.

A beetle which had previously been referred to in the *Bulletin* is in this number mentioned as having been identified at the United States Department of Agriculture as *Ecthoea quadricornis*, Oliver, of the family Cerambycidae, sub-family Lamiinae. In writing to Mr. Hart on the subject, Dr. L. O. Howard, Chief of the Bureau of Entomology, U.S. Department of Agriculture, states :—

The genus is closely allied to our own twig-girdlers of the genus *Oncideres*, and the girdled twig you send plainly indicates that *Ecthoea* does not differ in habits from our common *Oncideres cingulatus* which is so often referred to in the literature of economic entomology. There is apparently nothing recorded as to the earlier stages or life history of *Ecthoea*. La Cordaire, in his *Genera des Coleopteres*, states that the species is by no means common in the collections, but the insect occurs from Peru to the Guianas. According to the same authority the colour of the species is variable, and greenish specimens are occasionally met with. The male of *E. quadricornis* is very remarkable by having four horn-like projectures on the head.

In St. Lucia and St. Vincent another twig-girdler (*Oncideres amputator*) occurs which is reported to frequently attack the cacao shade tree known as Pois doux (*Inga laurina*), and also sometimes to attack cacao. This insect was dealt with in the *Agricultural News* for May 20, 1905 (see Vol. IV, p. 155), where an account was given of the work of girdling twigs supposed to be attributable to the Hercules beetle.

In the case of the twig-girdling beetles such as *Oncideres* and *Ecthoea* the females gnaw the wood of the twig to make the cut, and before the twig falls an egg is deposited in it. In this way the larva, on hatching in the wood of the twig, finds itself surrounded with dead or decaying matter which it utilizes as food material.

JUMPING SEEDS.

In a note on the so-called 'jumping seeds,' it is mentioned that these again made their appearance in the Botanic Gardens on March 27 last. They were observed on the 'Roble' tree (*Platymiscium platystachyum*, Benth.). 'Jumping seeds' are not seeds at all, but are a portion of the plant inhabited by a small weevil or snout beetle. They have a seed-like appearance, and gained their name on account of the fact that they are sometimes seen to spring a considerable distance from the ground into the air. This is, of course, due to the presence of the living beetle.

The manner in which the insects get into the tissues of the plant is explained in the following quotation from the *Bulletin* :—

It has now been observed that the larvae of the beetles enter the unopened flower-bud, and after eating out its interior, change into the pupa form, using the calyx of the flower-bud as a protective case during the dormant period. As they fall from the trees, the larva is apparently full-grown, and about to assume the pupa form, and can at this time jump as much as 4 inches from the ground. The insect is as yet undetermined, but evidently belongs to the snouted beetles or weevils (Rhyncophora), perhaps to the family Curculionidae.

The insect is an interesting one, seeing that it takes possession of a ready-made vegetable covering in which to undergo its transformation to the imago form.'

Dressing for Cuts on Cacao Trees.

The Agricultural Superintendent of Grenada at an Agricultural Meeting lately held in the island stated that trials made by Mr. Malins Smith at Diamond estate, Grenada, and by other cacao proprietors, with a mixture of resin oil and tar, in the proportion of one part of tar to four parts of oil, for application as an antiseptic dressing for cuts and wounds on cacao trees have given satisfactory results. Resin oil is a good dressing for wounds and was recommended by Mr. O. W. Barrett, when visiting Trinidad. It is, however, colourless and, therefore, it is difficult to see which wounds have been treated and which have not. The admixture of a little tar colours the oil, and by this means the objection is removed. Further trials with resin oil, as against tar, might be made in other cacao-producing districts in these islands.

SOIL BACTERIA AND NITROGEN ASSIMILATION.

Reference has frequently been made in the *Agricultural News* to the great value of leguminous crops (i.e., crops belonging to the natural order Leguminosae of which the pea is a well-known example) to the planter. This value is largely owing to the fact that a soil on which such a crop has been grown is, under favourable circumstances, enriched with nitrogen, through the medium of the soil bacteria which live in tubercules frequently noticeable on the roots of the leguminous plants. These bacteria find nourishment in the juices supplied by the plant, and through the energy supplied by this means, are able to assimilate or fix nitrogen directly from the atmosphere. The nitrogen so fixed is in part appropriated by the plant and built up into its tissues, but a good proportion remains behind in the roots on the removal of the green portion of the crop, and largely increases the stock of nitrogen in the soil which is available for the following crop. In experiments carried out in the United States it has been estimated that as much as 122 lb. of nitrogen, equivalent to about 800 lb. of nitrate of soda, is, under favourable conditions, taken from the air and added to each acre of soil, as the result of growing a leguminous crop.

In addition to the organisms associated principally with the roots of leguminous crops, there is another class of soil bacteria that can also fix atmospheric nitrogen. These are not associated with any particular crop, and are able to obtain the carbohydrate material necessary for their existence and activities from the humus or decaying vegetable matter in the soil. These independent forms of soil bacteria are widely distributed, and in warm, well-aerated soils, containing abundance of humus and mineral matter they fix a considerable amount of atmospheric nitrogen. An examination of the soil of two fields at the Rothamsted Experiment Station, England, which had been allowed to run wild for many years, showed an accumulation of nitrogen equal to 280 lb. of nitrate of soda per acre per annum in a field poorly supplied with lime, and to 600 lb. of nitrate of soda per acre per annum in a field well supplied with lime. Bacteriological tests showed that the nitrogen-fixing bacteria were present in much larger quantity in the second case.

In view of the expensive nature of nitrogenous manures such as nitrate of soda, and sulphate of ammonia, the planter will readily perceive the value of an agency by which this costly element is derived directly from the air, and a useful crop of green fodder grown on the soil at the same time.

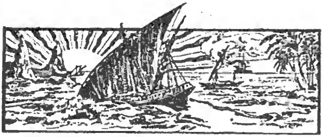
The soil conditions which the bacteria in question (and also other bacteria whose work in the soil consists in breaking down complex organic matter, and bringing it to a form in which the contained nitrogen is directly available as plant food) find most suitable for the exercise of their activities, are therefore well worthy of attention, and the following notes, taken from an abstract, lately appearing in the *Louisiana Planter*, of a German pamphlet which discusses the Sources and Uses of Nitrogenous Manures, relate to these points among others:—

Of the various constituents of commercial fertilizers nitrogen is undoubtedly the most expensive. Not a little skill and intelligence are required on the part of the agriculturist for placing before the growing crops a proper supply of nitrogen food in a manner both economical and efficient. The growing cost of nitrate of soda, the increasing production of sulphate of ammonia, the more or less successful attempts to manufacture nitrogenous materials out of the nitrogen gas in the air and finally, the various systems of green manuring and tillage are all factors to be reckoned with. The work of soil bacteria is another important factor, and the gain of nitrogen compounds in the soil through the agency of these organisms is very important. A better knowledge of these bacteria must prove of great benefit to every agriculturist, since such knowledge will enable him to utilize them to the best advantage in providing nitrogen for his crops.

Among the conditions which must be met in order to render the soil a suitable medium for the rapid and vigorous growth of nitrogen-gathering bacteria are those of moisture, humus, and mineral salts. It may further be added that a sufficient amount of lime must be present for the soil to be alkaline in reaction, since the bacteria cannot flourish in an acid medium. Bacterial life soon comes to a standstill in soils deficient in moisture. Similarly, bacteria as living things must have food, and this they find in great part in the humus. Hence humus is important not only as a source of food to bacteria, but also in creating conditions favourable for their development, since the greater the amount of humus, the greater the amount of moisture in the soil, and the greater the amount of moisture, the more rapid the growth of the bacteria. We should remember likewise, that bacteria are after all only minute plants, and as such they need a supply of available lime, phosphoric acid, and potash. Soils poor in these constituents are unsuited for the proper development of bacterial life, and therefore are unsuited for the vigorous growth of crops.

The need of large quantities of mineral plant food is particularly prominent in the case of leguminous crops, crops which form a partnership with bacteria in their roots, and become enabled thereby to draw lavishly on the vast store of nitrogen gas in the air. Crops of cowpeas, Bengal beans, velvet beans, woolly pyrol, alfalfa, clovers, etc. thus create a supply of nitrogen not only for themselves, but also for the non-leguminous crops which follow and feed on their decaying remains. It should be remembered however, that in this process of nitrogen accumulation by legumes, large amounts of lime, phosphoric acid and potash are used up; hence the best results in the utilization of atmospheric nitrogen by leguminous crops can be secured only when ample provision is made for the supply of the mineral ingredients of plant food. Repeated experiments have demonstrated that under favourable conditions leguminous crops may contain 100 to 200 lb. of nitrogen per acre, most of it derived from the air. It is thus evident that with an abundance of lime, phosphoric acid, and potash, the accumulation of atmospheric nitrogen by legumes is only governed by climatic conditions, and by the numbers and vigour of the bacteria in the root nodules.

Packing Rubber Seeds. It is stated in the *India-rubber Journal* that favourable results have been obtained at the Singapore Botanic Gardens by packing Para rubber seeds for export in burnt rice husks. The residue from the burnt husks consists of finely-divided charcoal, which is sprinkled with water before the seeds are packed in it. Kerosene tins are utilized for packing the seeds, and it is stated that after a journey occupying four months, 60 per cent. of the seeds despatched in this way germinated successfully.



GLEANINGS.

Experiments in the growth of different varieties of cabbage were carried out at the Botanic Gardens, British Guiana, during 1907-8. The *Annual Report* for the season mentions that the 'Jersey Wakefield' variety again gave the best results, as in 1906-7, and produced cabbages almost as good in flavour as if grown in England.

Applications have been sent in to the Imperial Department of Agriculture by seven estate overseers at Barbados, and by about the same number at Antigua, who are anxious to enter for the courses of reading and examination for overseers and sub-managers, of which particulars have been given in recent numbers of the *Agricultural News* (see Vol. VII, p. 209).

One or two hand cultivators which may possibly be found to be suitable for use in connexion with cotton cultivation have been received by the Imperial Department of Agriculture for experimental purposes. They are now being tried on cotton estates at Barbados, and it is hoped later to make trials with the implements in cotton fields in other islands.

From the commencement of the season up to August 27 last, there were exported from Barbados 29,247 tons of sugar and 48,947 puncheons of molasses, as compared with 32,635 tons of sugar and 61,245 puncheons of molasses, shipped during the corresponding period of last year.

Dr. H. A. Alford Nicholls has written to the Dominica press pointing out that the Italian Government are about to impose a duty on lemon products exported from the country. It is anticipated that as a result the price of citrate of lime will be increased on the English market by about 3*d.* per ℔.

The area under cocoa-nut palms in Ceylon reaches about 680,000 acres, chiefly in gardens and plantations owned by natives. Tea comes next in importance as regards the area planted, viz., 390,000 acres. There are 34,000 acres under cacao, and about 120,000 acres planted with rubber. The rubber plantations are owned almost entirely by Europeans.

The large proportion of foreign proprietors owning land in Cuba is evident from figures lately published in the *Louisiana Planter*. Of the properties actually producing sugar, 36 are stated to belong to Americans, 76 to Europeans and only 74 to Cubans. Judging by the number of factories therefore, over 50 per cent. belong to outsiders, and these properties are believed to be much more valuable than those belonging to Cubans. Of the large sugar crop of 1907—1,428,000 tons—the American factories produced 30 per cent., the European 35 per cent., and the Cuban 35 per cent.

An Agricultural Show will be held at St. Vincent in January next under the auspices of the Imperial Department of Agriculture and the Agricultural and Commercial Society of the island. Prizes will be awarded for cotton, cacao, arrowroot, sugar, rum, starches, coffee, fruit, vegetables, and live stock.

The trade returns of Trinidad for 1907-8 show that the import of cacao into the island (for subsequent re-export) increased by 2,762,825 ℔. compared with 1906-7. The greater part of this amount came from Venezuela. The rice imports showed an increase in value of about £1,300, although the quantity imported was less by 1,205,057 ℔., probably owing to local production.

The number of bales of cotton imported into Great Britain for the week ending July 23 last was 25,002 (including 33 bales British West Indian). The bales imported from January 1 to July 23 of the present year numbered 2,193,151 (including 7,282 bales British West Indian, and 5,456 bales British West African).

A small export tax of 3c. per 1,000 ℔. of sugar shipped abroad has been imposed in Trinidad, and took effect as from July 1 last. The object of the tax is to assist in providing funds for the re-organized Agricultural Department of the island. With an average sugar crop, the sum raised by this means will amount to about £700. (Port-of-Spain *Gazette.*)

A large number of exhibits have been forwarded to the Toronto International Exhibition from British Guiana. These include samples of rice paddy and of cleaned rice, Liberian and Arabian coffee, cacao, kola nuts, sugar, molasses, rum, fruit preserves, pickles, plantains flour, isinglass, timber, rubber, and tobacco.

A more than usually large area was planted with maize at Barbados for the present season. The crop is in good condition, but has of late suffered much through lack of rain. A small amount has ripened, and already been reaped, but in other cases, owing to the scarcity of green fodder, small cultivators have found it remunerative to cut the crop before it has reached maturity, and to sell it for forage purposes.

The Governor of the Windward Islands has approved of the sum of £50 being allocated for the purpose of making prize awards to small cacao growers in the parishes of St. David and St. Patrick, Grenada, for excellence of cultivation in the year 1908-9. On account of the zeal and interest shown in the Prize-holding scheme held last year in the parish of St. John, a further sum of £25 has been set apart for again holding a competition in the parish this year.

The sugar-cane crop in the south of Porto Rico suffered considerably from drought during 1907, and in order to deal with this subject, a sum of money has been voted in the Legislative Assembly of the island for the purpose of carrying out investigations to ascertain if artificial irrigation is possible. Suggestions have been made that beneficial results would follow if some of the small rivers that rise in the centre of the island, and now flow to the north, were diverted to a southerly direction. It is also recommended that reservoirs should be built, in which water could be stored during the rainy season, for distribution in time of drought.

TRINIDAD: ANNUAL REPORT ON THE BOTANICAL DEPARTMENT, 1907-8. By J. H. Hart, F.L.S, Superintendent.

Mr. Hart's report gives a record of the work done during the year at the Experimental Station, St. Clair; the Botanic Station, Tobago; River estate, and at Government House Gardens.

The total expenditure for the year on the Department was £5,521 12*s.* 5½*d.* The large sum of £2,468 1*s.* 5½*d.*, however, was realized by the sale of produce, seeds and plants. By far the chief source of revenue was the cacao sold from the Government plantation, River estate, which yielded £2,041 17*s.* 3½*d.* It will be seen, therefore, that the net cost of the Department was £3,053 11*s.*

During the year a total of 42,789 plants were distributed from the St. Clair nurseries, which is considerably less than that of last year. The number of cacao plants sent out was 11,614; rubber plants were distributed to the number of 10,960, while the cane cuttings sent from the station were 8,560. In addition about 60,000 seeds were also distributed. The plants in stock at the end of the year numbered 180,080.

Experiments in the cultivation of tobacco, fruits, sugar-cane, rubbers, fibre plants, cotton, and cacao were continued during the year at St. Clair. Special attention has been paid to citrus fruits, and an interesting acquisition to the gardens to which reference is made in the report is a seedless pomelow.

It is mentioned that there has been a smaller demand for rubber plants during the past year than in 1906-7, and this is probably accounted for by the fall in the price of rubber that has taken place. The rubbers at the Station include three species of *Hevea*, *Funtumia elastica*, and *F. Africana*, *Castilloa elastica*, *Landolphia Kirkii*, *Manihot Glaziovii*, and *Odontadenia Speciosa*. The last named is a native Trinidad variety from which a good sample of rubber has been produced.

The remunerative results obtained from the cacao plantation at River estate have already been mentioned. All the cacao produced was sold in the local market and realized an average price of $19·30 per 110 lb.

A sum of £52 18*s.* 6*d.* was obtained from the sale of banana plants from the nursery at River estate. The soil of the nursery, however, appears unsuitable for bananas, and since a number of private growers are also now selling plants, it is proposed to discontinue the nursery.

At the Tobago Botanic Station, the total receipt from the sale of plants, etc., was £27 7*s.* 6*d.*, this being £36 below the sum received in the previous year. Altogether, 13,483 plants were sent out.

Experimental plots of Sea Island cotton were planted in July and August. Those planted in the former month did the best, although the dry weather somewhat spoilt the return. The lint produced was of good quality, and further experiments in cotton cultivation are to be carried out in the present year.

TRINIDAD: ANNUAL REPORT OF THE GOVERNMENT ANALYST, 1907-8. By Professor P. Carmody, F.I.C., F.C.S.

Professor Carmody's report gives an account of the analytical and educational work carried on at the Government Laboratory, Trinidad, during the year. The total number of samples analysed—1,211—shows a decrease of 98 as compared with 1906-7. These samples are classified as follows: revenue samples, 463; criminal cases, 103; sanitary, 290; agricultural and industrial, 99; miscellaneous, 138; unofficial, 118.

The samples classed as 'sanitary' consisted for the most part of food and drugs, milk—of which 189 samples were analysed—being the article receiving most attention in this section.

Last year it was reported that there was a very satisfactory decline evident in the practice of adulteration of milk in Trinidad, the number of adulterated samples being but 10·7 per cent. of the total analysed. This was the lowest percentage of adulteration known in the island during Professor Carmody's experience of seventeen years. As a result, for a time, fewer samples of milk were taken for analysis. This has evidently led to a renewal of the practice of adulteration, since, during 1907-8, 24·3 per cent. of the samples of milk taken were found to be watered. With the object of checking the practice, Professor Carmody recommends the rigorous application of the Board of Health's regulations as to the non-renewal of a milk-seller's licence on being convicted of watering his milk.

The educational work carried on at the Government Laboratory consisted of courses of instruction in Agricultural Science, and in Theoretical and Practical Chemistry. Students from the Royal and St. Mary's Colleges, as well as Elementary School teachers attended for instruction, the total number being 119. Water culture experiments, as well as experiments in the growth of plants in pots and on plots of land were carried out for purposes of practical demonstration in connexion with the lectures given in Agricultural Science.

Pupils were prepared for the Cambridge University examination in Agricultural Science, and of the thirty-three students entered from Trinidad, fourteen passed the examination.

Professor Carmody expresses his appreciation of the excellence of the Cambridge syllabus in this subject, but at the same time he states his conviction that the course is too comprehensive to enable students with the limited amount of time available to those at the Government Laboratory, Trinidad, to prepare for the examination in one year, and he suggests that the time of preparation allowed should be increased.

TAPPING RUBBER TREES IN CEYLON.

The methods of tapping Para rubber trees that are being practised on various estates in Ceylon, are discussed in the course of an article which appeared in the *Indian-Rubber Journal* of May 18.

The half-herring-bone system of tapping appeared to be the most popular one. Results published some time ago showed that although that system gave the minimum yield in a short period of time, yet it was one which ultimately gave a large yield per tree without entailing undue waste of bark.

In the case of most estates the earliest period at which tapping operations were started was when the trees had a circumference of 20 inches at a yard from the ground.

RUBBER FROM TRINIDAD.

Various samples of rubber, etc., have been forwarded to London from Trinidad for display at the International Rubber Exhibition that is to be held at the Olympia, from September 14 to 26. A pamphlet prepared by Mr. Edgar Tripp, Hon. Secretary of the Trinidad Permanent Exhibition Committee, for distribution at the show, contains the following introductory notes with reference to rubber production in the colony:—

The rubber industry of Trinidad and Tobago is practically in its infancy, but promises vigorous and healthy growth. Ten years ago rubber, as an economic plant, was unknown in the colony. To-day it is being grown, either as the sole crop, or as an auxiliary to other cultivations, on some fifty plantations, and bids fair to form in the future no inconsiderable item in the exports of the island.

Samples sent for analysis to the Imperial Institute, London, have been favourably reported on, and there seems no reason to doubt that the soil and climate of Trinidad are admirably adapted for rubber production.

Initial shipments, amounting altogether to about 1,000 lb., the first product of the earlier planted estates, were made during the year ended March 31, 1907. During the year ended March 31, 1908, the quantity exported rose to 4,444 lb., and in view of the area now rapidly arriving at the stage of production, there should be a considerable increase in the near future.

RUBBER PRODUCTION IN CEYLON.

The Ceylon Government has prepared, for the use of the Emigrants' Information Office, an account of the position and prospects of the rubber industry in the colony.

As is well known, the cultivation of rubber-yielding plants has attracted a good deal of attention in Ceylon of late years, and it is now estimated that there are from 125,000 to 150,000 acres under rubber, Para being by far the chief variety grown, while Castilloa, Ceara, and Landolphia are also being planted. Little attention was paid to rubber in Ceylon until about seven or eight years ago. In 1901 no more than 2,500 acres were planted; by the year 1904, the rubber area had extended to 11,000 acres; early in 1905 it had reached 25,000 acres, and as stated above, 125,000 acres had been planted by the middle of 1907. There has been a similarly rapid development in the rubber-planting industry in the Federated Malay States, while very large extensions of the rubber area have lately been made in India, Burma, Java, and Borneo.

The official report states that the Ceylon planter can safely commence tapping his rubber trees when they are six years old. Only a small return is obtained, at first, of course. The yield increases annually, however, and each tree may be expected to give from 1 to 2 lb. of prepared rubber per annum. About 150 trees may be allowed to grow per acre, so that according to the above estimate, a monetary return of from £22 10s. to £45 per acre per annum may be expected.

The cost of Crown land in Ceylon ranges from £1 5s. to as much as £4 per acre, and land which is readily accessible, and suitable for rubber planting, is becoming scarce. An expenditure of from £20 to £30 is required in order to clear, plant, and bring an acre of rubber to the producing stage in six or seven years. In the official report, the cost of rubber production is estimated at about 1s. per lb. This is rather a low figure in the case of young trees, but on large plantations, and as the trees mature, experienced men have estimated that rubber can not only be prepared, but also delivered in London, at less than 1s. per lb. It will be seen, therefore, that though the price of rubber may drop to 3s., or even 2s. 6d. per lb., there should still remain a handsome margin of profit.

The rubber exports from Ceylon are naturally showing a continuous increase. While no more than 2,792 lb. were shipped in 1898, the quantity rose to 77,212 lb. in 1904, to 168,547 lb. in 1905, 327,000 lb. in 1906, and to over 650,000 lb. (or 300 tons) in 1907. Seeing that the world's production of rubber amounts to 65,000 tons per annum, it will be seen that neither Ceylon's contribution, nor that of the Federated Malay States, which is equal to about 600 tons of plantation rubber per annum, goes far to increase the danger of over-production.

CAMPHOR CULTIVATION IN CEYLON.

Camphor cultivation has been receiving attention in Ceylon for some years past, and in an article which appeared in the *Tropical Agriculturist* for April last the progress that has been made is discussed.

Experiments made at the Hakgala Botanic Gardens demonstrated that the camphor trade would probably flourish under the climatic conditions prevailing in Ceylon. Several planters became interested, and since then a large number of plants have been regularly raised from imported seeds and from cuttings, and distributed to planters in different parts of the island.

At the present time a good number of estates are found with well established areas planted with camphor. These are chiefly situated at elevations of 3,000 to 5,000 feet. Camphor is found to be suited to ravines, or hillsides exposed to the wind, where scarcely anything else will succeed. It does not flourish at an altitude less than 2,000 feet. Apart from the monetary value of the product, the camphor tree is well adapted for shading roadsides, and forming wind-belts for tea and other small-growing crops. The tree is evergreen, and is naturally dense and bushy, and furnished with branches to the base. If unpruned it grows to a height of 40 feet or more. In the method of cultivation adopted, however, the plants are cut back and kept at a height of 4 or 5 feet.

The article in the *Tropical Agriculturist* is illustrated by a photograph of a plantation five years old, the plants of which were raised from seed imported from Japan. The seedlings have been planted out at a distance of 8 feet by 4 feet apart, in land at an elevation of about 4,500 feet. The trees were allowed to grow till they reached an average height of 16 feet, when they were cut back to a height of 4 feet. The prunings obtained yielded about 60 lb. of camphor to the acre. After an interval of five months the trees were again clipped, and a yield of about 50 lb. of camphor per acre was obtained. Experience has since shown that the trees should not be allowed to run up to 16 feet, but should be topped back when about three and a half years old. The bushes may be clipped at least three or four times a year.

Clippings obtained from Hakgala Gardens about six years ago yielded upon distillation at the rate of 0·75 to 1 per cent. of camphor, and from 27 to 34 per cent. of camphor oil. It has been estimated that, on an average, 14 lb. of clippings per annum can be obtained from each bush. Assuming that the trees are planted 8 feet by 4 feet apart, which would give 1,360 trees to the acre, this would work out at a return of about 190 lb. of camphor per acre.

THE 'PULQUE MAGUEY' OF MEXICO.

Under the title 'The Century Plant and some other Plants of the Dry Country,' Professor William Trelease, of the Missouri Botanic Gardens contributed a highly interesting paper to the *Popular Science Monthly* of March 1907, dealing with the various Agaves found in Mexico and their characteristics and uses. This paper includes a lengthy account of *Agave atrovirens*, or the 'pulque maguey' from which the national alcoholic drink of Mexico is produced. The details given below as to the methods followed in the manufacture of pulque, and the extent of the trade in this product are extracted from Dr. Trelease's article:—

South of the City of Mexico, centreing about the little town of Apam, the species of Agave is almost exclusively the dark-green giant *A. atrovirens*, though, as with extensively cultivated plants elsewhere, it is grown in numerous horticultural varieties which look much alike to the botanist, but are distinguished by the planter. Over thirty such forms are said to be planted in the plains of Apam.

As one passes to the colder regions of the north or descends from the tableland into the hot country, still other and different looking species of the same type replace *A. atrovirens*, which, however, far outnumbers and surpasses them all in its aggregate importance. These plantations of *A. atrovirens* are the basis of the pulque industry of Mexico—at once a large item in its agricultural wealth and one of the greatest curses of its labouring population.

The present traffic in pulque is large. Something over 5,000,000 barrels of it are used in the Mexican republic every year, of which quantity about half is consumed in the capital city, and much of the remainder in Puebla and the other large cities of the central plateau Cheap as it is (for it sells for from one to 3c. of Mexican money for a large glass) its aggregate value amounts to several million dollars per year. Special trains are run into the city of Mexico every morning for its delivery, as is done with the milk supply of American cities. In the Apam district, the plantations are chiefly found on the large haciendas or estates.

The 'pulque maguey' is a large plant, and its rosette of thick leaves, though appearing to lie next the ground, is really spaced along a stout trunk as large as a small barrel. The whole, charged with sap, weighs several tons. If left to itself, as it is in gardens on the Riviera where it is called *A. Salmiana*, like the century plant *Agave americana* it produces a gigantic scape, topped with a candelabrum of flowers, when somewhere in the neighbourhood of fifteen years old. This is never permitted on the large plantations, for the plant possesses its maximum value when it has reached vegetative maturity and the scape is about to develop. At the critical moment, known from the appearance of the central bud, this is cut out and a shallow cavity is made in the crown of the trunk, which is covered by a stone, pieces of maguey leaves, or other protection. Into the cavity so formed the sap exudes. It is removed two or three times a day, the surface being scraped and the cavity slightly enlarged each time, until at last nothing but a thin shell of the trunk remains, the leaves meantime having given up their content of fluid and dried to their hard framework—as happens naturally during the flowering period of all the larger Agaves, when the reserve of sap is drawn into the rapidly growing scape and flowers.

For a period of three months or more a good plant yields a gallon or two of sap daily, and its total value may be not far from $10 on an average, from which it will be seen that a large maguey plantation represents a considerable item in the assets of a landed proprietor of the plains of Apam.

The fluid which collects in the hollowed trunk of a cut maguey plant, and is gathered in the manner described, is called 'agua miel', or honey-water, because of its sweetness: 9 or 10 per cent. of its weight is sugar, and this furnishes the basis for the alcoholic fermentation which is the chief factor in its conversion into pulque. The 'agua miel' of the Apam district is thin, clear, and colourless, and possesses a rather pleasant taste.

The fermentation practices in pulque making are still mostly primitive. I have had a Mexican gentleman tell me that although when the agua miel was gathered and fermented with due cleanliness he considered it a delicious drink, he would not think of touching pulque as offered, for instance, at the railway station in Apam. The vats used in the fermentation are of ox-hide stretched on frames, and they are usually 3 or 4 feet wide, and nearly as deep. Fermentation is begun by the introduction of a starter or 'mother of pulque,' obtained by preliminary fermentation, and is carried on either without, or at most with little, artificial control of temperature, and under conditions of positive or negative cleanliness which differ with the various haciendas.

When marketed, the pulque is a white, decidedly viscous fluid containing about 8 per cent. of alcohol: fermentation has not been solely alcoholic, however, and its flavour is in part due to changes wrought by bacteria of several kinds which are introduced with the starter in company with the yeast. Continuation of the action of these collateral ferments causes the beverage to spoil in a day or two under ordinary conditions.

Where the maguey, though capable of cultivation, yields a lesser or inferior product, agua miel is often more appreciated in its unfermented state. As hawked around the streets of Monterey, for instance, in porous earthenware receptacles, it is a cool, yellowish fluid, that is very refreshing on a hot day, and the limpid, yellowish, cidery, foamy product of its fermentation in the north is frequently more to the taste of the foreigner than the white, viscous, odoriferous pulque of the Apam district—which alone pleases the adept.

Considerable medicinal virtue has been claimed for pulque, and some efforts have been made to specially prepare, bottle, and pasteurize it for medicinal or even table use: but, except in the region of its production, where it is the common beverage, the bulk of it is used as an intoxicant, pure and simple. From it is also produced a rather small quantity of distilled liquor—'mezcal de pulque.'

Mezcal is a term applied comprehensively to the liquor obtained by distillation from the fermented juices of agaves. Four or five million gallons of it a year are produced, and its value may amount to some $2,000,000. The centre for the manufacture of this beverage is to the west of Guadalajara, and the town of Tequila, situated there, has given its name to the higher grade of liquor, which is clear, smoky, rather smooth, and with a characteristic essential flavour; it usually contains forty or fifty per cent. of alcohol, and like pulque, possesses certain medicinal properties.

Mezcal is sold cheaply. It is to be found everywhere and contributes largely to the demoralization of the native labourers, who often drink it to excess.

To supply the distilleries at Tequila, a considerable acreage is planted to mezcal agaves. Those chiefly used for the purpose belong to a well-marked, narrow-leaved species which a few years ago received the appropriate and distinctive name *A. Tequilana*.

MARKET REPORTS.

London,—August 18, 1908, 'THE WEST INDIA COMMITTEE CIRCULAR: Messrs. E. A. DE PASS & Co., July 24, 1908; Messrs. Kearton, Piper & Co., August 17, 1908.

ARROWROOT—Quiet: no quotations.

BALATA—Sheet, 2/1 to 2/4; block, 1/7½ to 1/8.

BEES'-WAX—Good quality, £7 7*s.* 6*d.* to £7 12*s.* 6*d.* per cwt.

CACAO—Trinidad, 59/- to 74/- per cwt.; Grenada, 51/- to 59/- per cwt.

COFFEE—Santos, 25*s.* 9*d.* per cwt.; Jamaica, no quotations.

COPRA—West Indian, £16 to £16 10*s.* per ton.

COTTON—St. Vincent, 14*d.* to 15*d.*; Barbados, 14*d.* to 15*d.*; St. Kitt's, 14*d.* to 15*d.*; Montserrat, 14*d.* to 15*d.* per lb.

FRUIT—

BANANAS—Jamaica, 4/6 to 6/- per bunch.

LIMES—Very slow sale, 2/6 to 3/- per box.

PINE-APPLES—St. Michael, 1/3 to 3/- each.

GRAPE FRUIT—7/- to 9/- per box.

ORANGES—Jamaica, 8/6 to 9/- per box.

FUSTIC—£3 10*s.* to £4 10*s.* per ton.

GINGER—Very slow of sale.

HONEY—19*s.* to 27*s.* per cwt.

ISINGLASS—West India lump, 1/9 to 2/4 per lb.; cake, 10*d.* per lb.

LIME JUICE—Raw, 1/2 to 1/4 per gallon: concentrated, £14 7*s.* 6*d.* per cask of 108 gallons; Distilled oil, 2/4 to 2/5 per lb.; hand-pressed, 4/3 to 4/6 per lb.

LOGWOOD—£3 10*s.* to £4 5*s.* per ton; roots, £2 10*s.* to £3 10*s.* per ton.

MACE—Quiet; no quotations.

NUTMEGS—Quiet.

PIMENTO—Quiet.

RUM—Jamaica, 3/3 to 8/-; Demerara, 2/4 to 2/7 per gallon; Trinidad, no quotations.

SUGAR—Crystals, 15/9 to 16/9 per cwt.; Muscovado, 15/10; Molasses, no quotations.

New York,—August 7, 1908.—Messrs. GILLESPIE, BROS. & Co.

CACAO—Caracas, 12¾c. to 14⅝c.; Grenada, 13c. to 13⅛c.: Trinidad, 13¼c. to 13⅝c.: Jamaica, 10¼c. to 12c. per lb.

COCOA-NUTS—Jamaica, select, $22·00 to $24·00: culls, no quotations: Trinidad, $21·00 to $23·00; culls, $13·50 to $14·00 per M.

COFFEE—Jamaica, ordinary, 7¼c.; good ordinary, 7¾c. to 8⅛c. per lb.

GINGER—10¾c. to 14c. per lb.

GOAT SKINS—Antigua and Barbados, dry flint, from 48c. to 49c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c. per lb., dry flint.

GRAPE FRUIT—California, no quotations.

LIMES—$3·25 to $4·00 per barrel. Market over-stocked.

MACE—28c. to 31c. per lb.

NUTMEGS—110's, 9c. per lb.

ORANGES—California, no quotations.

PIMENTO—4c. to 4½c. per lb.

SUGAR—Centrifugals, 96°, 4·12c. Muscovados, 89°, 3·40c.; Molasses, 89°, 3·32c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. JAMES A. LYNCH & Co., August 24, 1908; Messrs. T. S. GARRAWAY & Co., August 31, 1908.

ARROWROOT—St. Vincent, $4·00 to $4·50 per 100 lb.

CACAO—St. Vincent, $14·00 to $15·00 per 100 lb.

COCOA-NUTS—$16·00 per M. for husked nuts.

COFFEE—Jamaica, $8·50 to $10·50 per 100 lb

HAY—$1·20 to $1·25 per 100 lb.

MANURES—Nitrate of soda, $62·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $75·00; Sulphate of potash, $67·00 per ton.

MOLASSES—No quotations.

ONIONS—Strings, $2·25 to $2·27 per 100 lb.

POTATOS—Teneriffe, $2·60 to $3·50 per 160 lb.

PEAS—Split, $6·55; Canada, $3·30 per bag.

RICE—Demerara, $5·46 to $5·90 (180 lb.); Patna, $3·80; Rangoon, $3·00 per 100 lb.

SUGAR—No quotations.

British Guiana,—Messrs. WIETING & RICHTER, August 22, 1908; GEORGETOWN CHAMBER OF COMMERCE FORTNIGHTLY MARKET REPORT, August 21, 1908.

ARROWROOT—St. Vincent, $9·50 to $10·00 per 200 lb.

BALATA—Venezuela block, 32c.; Demerara sheet, 48c. per lb.

CACAO—Native, 16c. to 18c. per lb.

CASSAVA—60c. to 96c.

CASSAVA STARCH—$9·00 per barrel of 196 lb.

COCOA-NUTS—$12·00 to $16·00 per M.

COFFEE—Creole, 12c. to 13c.; Jamaica, 12c. per lb.

DHAL—$5·50 to $5·60 per bag of 168 lb.

EDDOS—96c. to $1·08 per barrel.

MOLASSES—Yellow, no quotations: Dark, no quotations.

ONIONS—Madeira, 3c. per lb.; Lisbon, no quotations; Dutch, 2½c. per lb.

PLANTAINS—12c. to 32c. per bunch.

POTATOS, English—No quotations.

POTATOS, Sweet—Barbados, $1·92 per bag.

RICE—Ballam, $6·25; Creole, $5·50 to $5·60 for good; Seeta, $6·00.

SPLIT PEAS—$6·75 per bag (210 lb.); Lisbon, $4·50.

TANNIAS—$1·08 to $1·32 per bag.

YAMS—White, $2·16; Buck, $2·16 to $3·00 per bag.

SUGAR—Dark crystals, $2·30 to $2·55; Yellow, $3·50; White, $3·70 to $4·60; Molasses, $2·00 to $2·20 per 100 lb. (retail).

TIMBER—Greenheart, 32c. to 55c. per cubic foot.

WALLABA SHINGLES—$3·60 to $5·75 per M.

——CORDWOOD—$2·40 to $2·64 per ton.

Trinidad,—August 22, 1908.—Messrs. GORDON, GRANT & Co.

CACAO—$13·00 to $13·50 per fanega.

COCOA-NUTS—No quotations.

COCOA-NUT OIL—60c. per Imperial gallon, cask included.

COFFEE—Venezuelan, 8½c. per lb.

COPRA—$2·85 to $3·00 per 100 lb.

DHAL—$4·70 to $4·80 per 2-bushel bag.

ONIONS—$1·50 to $1·60 per 100 lb. (retail).

POTATOS, English—$2·00 to $2·25 per 100 lb.

RICE—Yellow, $5·40 to $5·75; White, $4·75 to $5·85 per bag.

SPLIT PEAS—$5·85 to $6·00 per bag.

SUGAR—American crushed, $5·00 to $5·10 per 100 lb.

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Lead Arsenate as an Insecticide.

DURING the present cotton-growing season lead arsenate will be tried on several estates in Barbados as an insecticide in combating the cotton worm. For the past five years Paris green has been the standard material for this purpose, and all other insecticides have been compared with it, in judging their value. It has been almost universally applied in a dry condition, mixed with air-slaked lime in the proportion of 1 lb. to 6 lb. of lime, although many other proportions have been tried.

Paris green has been used with good results in the fight against the cotton worm, but there are certain disadvantages connected with the use of this material. It is in the hope of getting an equally effective insecticide, and at the same time of doing away with some of the disadvantages attendant on the employment of Paris green, that lead arsenate is being tried this year. The hope that this insecticide will prove satisfactory for the purpose is strengthened by the results of rather extensive trials carried out on one estate at Barbados last season.

The advantages attending the use of Paris green are that it is quick in its action, easy of application, and cheap in cost. It may be applied in a dry form to the cotton plant by means of very simple apparatus. The disadvantages connected with the use of this material are, that when applied as a dust, it is easily washed off by showers of rain; that when large amounts are used, it often burns or scorches the leaves of the cotton plant, and that it sometimes has an irritating effect on the skin of the labourers, which frequently makes them unwilling to do the work of dusting. This is a serious matter when the attacks of the cotton worm are so severe that it is necessary to apply Paris green immediately. Much may be done to obviate this last difficulty by care on the part of the overseers to ensure that the labourers keep a distance of several rows from each other in the field, and on the part of the labourers themselves to keep as much as possible to windward of the poison they are applying.

Lead arsenate was first used as an insecticide by the Gypsy Moth Committee in Massachusetts. It had been found that when Paris green was used as a spray at ordinary strength (1 lb. to 100 gallons of water), the gypsy moth caterpillars were not killed, and when the strength of the mixture was increased, the foliage of the trees was injured. Lead arsenate completely replaced Paris green in this work as soon as it was found that when the arsenate was used at ordinary strength the caterpillars were killed, and that whatever the strength at which it was applied, it did not injure the foliage on which it was sprayed.

There are several advantages to be expected from the use of lead arsenate in combating the cotton worm. The fact that, as already stated, this substance does not injure the foliage of plants is of considerable importance. Lead arsenate also has a very great power of adhesion to the leaves of plants, and this is one of the greatest inducements to its use. It will be found that after the lapse of two or three hours of sunshine from the time of application, only a very little of the arsenate would be washed from the leaves by a really heavy shower.

On the other hand, there are certain features that are likely to seem disadvantageous when considered from the point of view of the planter. In the first place, lead arsenate, up to the present time, has been sold only in the form of a heavy paste, and can be applied only as a spray. This necessitates the purchase of machines, in place of the bags and tin dusters, which have been used for the application of dry Paris green. Secondly, lead arsenate is much slower in action than Paris green. This is likely to be a disadvantage which will be severely felt unless a very sharp look-out is kept for the first appearance of the cotton worm. In past seasons it has happened frequently that the cotton worm has not been noticed until many of the caterpillars were full-grown. In such a case, as every cotton grower well knows, it is very difficult to prevent damage to plants even by the most prompt application of Paris green.

It will probably be found best to spray at regular intervals to ensure that a sufficient amount of poison is always on the plant, and especially to ensure that the young leaves are protected as they develope.

The form of sprayer most in favour with the cotton planters of Barbados is the 'Auto-Spray,' which is a compressed air sprayer. That is, the air is pumped into the tank until sufficient pressure is obtained, and the spray mixture is forced through the nozzle until the air pressure is entirely reduced. By careful trial, the amount of spray material in the cylinder and the amount of pressure may be so adjusted, that one pumping will serve to force out all the spray mixture.

In this connexion, another disadvantage in the use of lead arsenate is likely to be noticed. This material is very heavy, and a considerable amount of agitation is necessary to prevent the poison from settling to the bottom of the sprayer and thus producing an unequal distribution. Whether it will be possible to get the labourers to agitate the mixture sufficiently by shaking the sprayer as they walk, so that the poison may be equally distributed throughout the entire operation of spraying, remains to be seen. The fact, however, that good results in the use of lead arsenate have already been obtained at Barbados, would seem to indicate that this is not an insurmountable obstacle.

One of the points of comparison between dusting and spraying has reference to the weights of the materials used. In dusting with Paris green and lime at the rate of one to six, it will be seen that in applying each pound of the poison, a total of 7 lb. of material has to be handled by the labourers, while in spraying at the rate of 1 lb. of lead arsenate to 100 gallons of water, the material used will have a total weight of nearly 1,000 lb. These figures may be taken to represent the amounts used per acre per application.

In addition to this, the value and weight of the respective apparatus used in the application of the spray and of the dust are to be taken into consideration. The cloth bag used in the application of Paris green costs only a few cents and has very little weight, while each sprayer weighs several pounds, and represents an initial cost of several dollars.

Paris green usually costs slightly more per pound than lead arsenate, but since it is customary to use a little more of the latter substance than of Paris green, the difference in the first cost of the two materials is very small. If, however, the lead arsenate proves, as is expected, to be much more adhesive than Paris green, the saving of several applications, and the more continuous protection to the plants, due to the lasting properties of the lead arsenate, may make this a much cheaper insecticide in the long run.

It may be added that during the present season one firm of manufacturing chemists in the United States has succeeded in producing a good grade of lead arsenate in a dry powdered form. This has been tried by the Crop Pest Commission of the State of Louisiana in certain of their experiments and the results are very promising. A small quantity of this material will be imported by the Imperial Department of Agriculture for trial.

SUGAR INDUSTRY.

Sugar Production in Java.

A statistical article dealing with sugar production in Java was lately contributed to the *Louisiana Planter* by Dr. H. C. Prinsen Geerligs, Director of the Agricultural Experiment Stations in the island.

In 1898 the sugar-cane area of Java was 198,500 acres. To-day it is 285,289 acres. The number of sugar estates, however, which was 188 ten years ago, has fallen to 177 at the present time. This is owing to the prevalent tendency for the amalgamation of small estates, and to the development of the central factory system. The sugar industry is very profitable in the island, and many estate owners are anxious to purchase more land, but this cannot be done without permission from the Government, who will not permit extension of the sugar-cane area unless it can be done without prejudice to the requirements of the native rice-growing population. On the other hand, many estates on which indigo was formerly cultivated have latterly become sugar plantations.

The output of sugar has rapidly advanced with the extension in the cane acreage. The total yield of sugar ten years ago was 725,030 tons, while the 1907 crop reached 1,210,197 tons. During the same period the average yield of sugar-cane per acre advanced from 34·6 tons to 38·75 tons. Yields of sugar ranging from 4·9 tons to 5·7 tons per acre have been obtained on the best estates in the island each year since 1898.

Enzymes of the Sugar-cane.

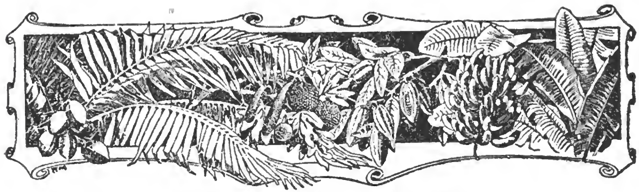
Enzymes are chemical compounds usually known as unorganized or soluble ferments, in contradistinction to the yeasts, bacteria, etc., which are referred to as organized ferments. These enzymes occur naturally in various parts of the tissue of plants, being secreted by the protoplasm, and they are associated with various vital processes of the plant, especially those of nutrition. They have the power, when in contact with certain substances, of causing these substances to decompose into simpler compounds. Diastase is one of the best known among the enzymes. It occurs in leaves, buds, and in seeds, and possesses the power of converting insoluble starch into maltose, which is a soluble sugar. Reserve food material is frequently stored up by plants in seeds and tubers in the form of starch, as in maize and potatos, and the function of the diastase present in the seed or tuber is to convert the starch into a soluble form, so that in this state it is available for the needs of the embryo plant produced from the seed or tuber.

The following notes on enzymes present in the sugar-cane are taken from *Bulletin 91* of the Louisiana Agricultural Experiment Station, 'The Chemistry of the Sugar-cane and its products in Louisiana':—

Enzymes, or soluble ferments, although present in exceedingly small amounts in the sugar-cane, play a very important rôle in the physiological processes of the plant, and require more than a passing mention. If the green tops of a sugar-cane be well macerated, the juice expressed and treated with an antiseptic agent, such as chloroform or thymol, in order to prevent fermentation by yeasts or bacteria, it will be found that the sucrose content of the juice undergoes a gradual diminution, though no traces of micro-organic life are evident, and that simultaneously with this decrease in sucrose, the content of reducing sugars, i.e., of glucose and fructose increases. This is a well-marked instance of the activity of the enzyme or soluble ferment *invertase*, which is present in the leaf of the cane. This enzyme occurs almost universally throughout the vegetable kingdom, especially in the green or growing parts of the plants. Invertase has a very practical industrial bearing outside of its physiological importance. The gradual falling off in sucrose content of a sugar-cane which has been cut and kept for any length of time is due very largely to the spontaneous inversion (or conversion into glucose and fructose) of the sucrose, caused by this ferment. If the green tops of the cane are removed at the time of cutting, the loss of sucrose is much less evident. This can easily be seen by reference to the experiments carried on at Audubon Park in 1893, in which several lots of cane were cut and laid up, and one-half of each lot had the tops removed, while the tops were left in the case of the other half. Otherwise, all the conditions were the same, and at the end of the month the tops of the second half of the canes in each lot were removed. In the first lot, the canes, the green tops of which had been removed a month before analysis of the juice took place, showed a sucrose content of 13·3 per cent., and a glucose content of 1·25 per cent. The second half of the canes of this lot, which had been cut and kept for a month with the cane tops remaining on, contained at the end of the month but 12·1 per cent. of sucrose (a decrease of 1·2 per cent.), while the percentage of glucose reached 1·85 per cent.

In a second test the percentage of sucrose present at the end of the month, in canes laid up with the tops remaining on, was 11·8, as compared with 13·7 per cent. in the other half of the lot, where the growing tops had been removed at the beginning of the month. While the sucrose content had decreased from 13·7 to 11·8 per cent. where the cane tops had been left on, the percentage of glucose increased considerably, as is evident from the fact that while only 1·0 per cent. of glucose was present in the canes the tops of which had been removed, the percentage of glucose was 1·85 where the tops remained on. It will be seen therefore, that the inverting enzyme occurs in chief part in the growing tops of the cane. Inversion of the sucrose results in an increase in the glucose content, though this increase is not proportional to the loss of sucrose content. This discrepancy is probably due to the destruction of the glucose as the result of respiration in the leaf. The experiments show conclusively that the vital processes of the cane go on, even after it has been cut. It must not be forgotten that there is also a slow inversion of sucrose in canes that are cut and laid up with the green tops removed.

A marked peculiarity of sugar-cane juice, as of all vegetable juices, is the rapid darkening in colour which takes place after expression. This darkening is much more evident within the body of the cane, especially in the region of the eyes and growing parts, and when its tissues are laid open to the air. We have here an evidence of another enzyme. This belongs to the class of oxydases, or ferments whose activity results in oxidation of the substances with which they are brought into contact. The intense blue colouration which the tissues and juices of plants take on when treated with tincture of guaiacum (a resin from the Lignum-vitae tree) is ascribed to an oxydase or oxidizing ferment. The decomposing action which plant extracts exercise upon hydrogen peroxide has been similarly explained. Juice from sterilized canes show none of these reactions, on account of the destruction of the enzyme by the high temperature to which it has been submitted.



WEST INDIAN FRUIT.

MANGO GROWING IN CUBA.

The mango grows in a wild state throughout the island of Cuba, and since this fruit is one that commands a high price on the American market, some attention has of late been given to its commercial cultivation with the object of developing an export trade in the future.

The soil and climatic conditions required by the mango, the methods of propagation, planting, and tending the tree, picking and packing the fruit, etc., are discussed in an article which appeared in the July number of the *Cuba Review*, and a summary of the chief points dealt with may be of interest.

The mango does not appear particular as to the soil on which it grows. Vigorous trees are sometimes seen growing on very poor land, but the return obtained is of course much increased by the application of fertilizers in such a case. Good drainage of the soil is important, for the mango tree will not thrive in the presence of stagnant water. Dry weather is required during the blossoming and fruit-setting period, but after the fruit is set and during the ripening period, abundance of moisture is essential. The climatic and soil conditions of Cuba, it is stated, are well adapted to successful mango cultivation.

The method of inarching or grafting by approach is the most suitable method of propagation of the mango. For this purpose seedlings are raised from seeds planted in pots. Well-grown plants of about two years old are ready for inarching. The process of union will take from eight to ten weeks to complete and during this period the seedlings require frequent watering and constant attention. Many seedlings may, of course, be grafted at one time from one parent tree. When the union is complete, the branch of the parent tree is completely severed, and the pot containing the grafted plant is then removed and placed for three or four weeks in a shady place, sheltered from wind. At the end of this time it is ready for transplanting in the field.

In a mango orchard, a distance of at least 30 feet each way should be allowed from tree to tree: 30 feet by 40 feet or even 40 by 40 feet is not too close. For the purpose of setting out the young grafted plants, holes must be dug which should be fairly deep and broad. These should then be filled in around with good surface soil, and the plant finally set in at the same depth as before transplanting, the earth being tightly pressed around.

At present, of course, mangos are not shipped on any large scale, but the fact that the fruit may be exported to Europe in good condition has been proved by a few shipments made from Jamaica to England, and from Martinique to Paris. For successful shipment to distant countries, however, great care is needed for gathering and packing, since the slightest bruise or injury soon shows itself on the fruits.

The mangos should be picked when fully grown but before the softening, which is characteristic of the ripening stage, sets in. Care should be taken to pick the fruit in the dry condition, and only just before it is to be placed on board the steamer. Each fruit should be wrapped in soft, fresh, clean wrapping paper such as is used for oranges.

The crates in which the fruits are packed should be shallow and not too large. They should be substantially made of thin wood, and undue pressure in packing should be avoided. Some fine grass may with advantage be placed in the bottom of the crate in which the fruits are despatched.

At the close of the article in question, reference is made to one or two of the best varieties of mangos grown in Cuba, to which it is thought that attention might most profitably be given, and which are therefore recommended for grafting purposes. These include the Apple mango, the Philippine mango, a variety known as the 'Mulgoba' imported from the United States, the 'Alphonse' or 'Alfoos,' and No XI.

FRUIT GROWING IN JAMAICA.

Some interesting details in regard to what is evidently a prosperous fruit-growing concern in Jamaica were lately published in the *Jamaica Times*. The property referred to is the Hartlands plantation, consisting of some 2,300 acres of rich, level, clayey land, which is under irrigation. Pines and bananas were grown for a time on part of the plantation, but neither of these crops gave satisfactory returns, and were abandoned. Ordinary pen work is carried out on a considerable scale on the estate and large numbers of cattle are reared. Citrus fruit cultivation was started some six or seven years ago, however, and promises to be a very profitable undertaking. About 120 acres have been planted with oranges, and 75 acres with grape fruit. The fruit trees are planted 22 yards apart and there are now over 15,000 trees on the property. Trenches have been dug across the beds by means of which the orange trees are irrigated when water is required. The fruit gathering season begins in September, and there is always a ready market for the grape fruit. During the year 1907-8, there were exported from the plantation 4,000 boxes of oranges, and 12,000 boxes of grape fruit.

INTERESTING ANIMALS AT THE BARBADOS PLOUGHING MATCH.

The accompanying illustrations represent two interesting animals which were on view at the Ploughing Match and Show of Stock held at Poole plantation on June 24 last (see *Agricultural News* of July 11, page 217).

The Zebu bull (Fig. 14) is the property of Dr. C. E. Gooding, Stirling plantation, and was awarded a first prize at the above show. This animal is about five years old, and was purchased from Trinidad, being bred from parents reared at the Government Stock Farm of that island. He is stated to be quiet, and to work steadily in plough or cart.

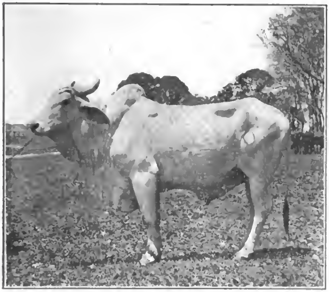


Fig. 14. Prize Zebu Bull at Barbados.

The Water Buffalo (Fig. 15), which was an object of considerable interest at the Ploughing Match, was exhibited from Society estate. This animal is about five years old, and was purchased from Surinam three years ago.

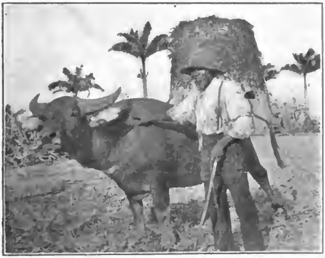


Fig. 15. Water Buffalo at Barbados.

The water buffalo is valuable on account of its great hardiness and strength, and the hardness of its hoofs as compared with the ordinary estate cattle is an additional point in its favour. Two water buffalos are equal to four ordinary oxen for working purposes. These animals are not particular as to diet, and will readily consume any food given them. On this account they are easily kept in good condition.

There are but four water buffalos in Barbados, all of these having been brought from Surinam at the same time.

Acknowledgements are due to Mrs. T. H. Bindley, of Codrington College, who kindly supplied the photographs of the two animals, from which blocks for the above pictures were prepared.

COFFEE PREPARATION AND SHIPMENT.

Messrs. Major & Field, a well-known firm of London brokers, have lately issued a leaflet containing directions to coffee growers as to the methods which should be followed in the preparation of their produce for shipment, if this is to command the best price on the market.

Growers are recommended to prepare their coffee by what is known as the West Indian method, and to ship it in 'parchment' form. Uniformity of appearance and colour are highly prized by buyers, and to ensure these characteristics only berries of uniform ripeness should be gathered at one time. Pulping should follow immediately after gathering, and the coffee is then fermented and washed. During the washing process the beans should be stirred, and all light and imperfect beans, as well as leaves, sticks, etc., which rise to the surface, should be removed.

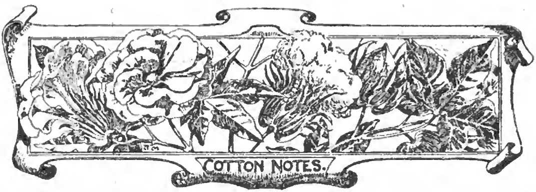
After washing, the beans must be carefully and thoroughly dried, and the manner in which this operation is carried out largely determines the market value of the product. The coffee is now in the 'parchment form,' and when drying is completed, should be shipped without loss of time.

It is claimed that growers derive many advantages by forwarding their produce as 'parchment' coffee, to be husked in London. The parchment covering acts as a protection to the bean in transit and preserves its colour. Further, planters are enabled to market their produce earlier than if they waited to husk it themselves, which means selling before the market is glutted.

Brokers recommend that coffee for transport to England should be packed in stout Hessian bags, about 36 inches long by 30 inches wide. These bags will contain about 104 ℔. of parchment coffee.

PERSONAL NOTE.

Mr. C. W. Jemmett, late of the Wye Agricultural College, Kent, who has been appointed Government Entomologist for Southern Nigeria, arrived at Barbados from England on September 14, and will be temporarily attached to the scientific staff of the Imperial Department of Agriculture. Mr. Jemmett will probably remain in the West Indies for several months, and during this time will be engaged in making himself acquainted, as far as possible, with the circumstances and conditions of tropical agriculture and entomology before proceeding to take up his duties in Nigeria.


COTTON NOTES.

WEST INDIAN COTTON ON THE LIVERPOOL MARKET.

Messrs. Wolstenholme & Holland, of Liverpool write as follows under date of August 31 last, in reference to the sales of West Indian Sea Island cotton on the Liverpool market:—

Since our last report a moderate amount of business has been done in West Indian Sea Island descriptions, but confined almost entirely to extra fine cotton and stains.

The sales include Barbados at 14¾*d.*, St. Vincent at 17*d.* to 22*d.*, the latter figure representing a few bales of very special quality, and stains at 3*d.* to 8½*d.*

The fine shipping trade continues very dull, and spinners are quite indifferent about buying.

COTTON NOTES FROM ST. KITT'S.

Mr. F. R. Shepherd, Agricultural Superintendent of St. Kitt's-Nevis, has forwarded the following notes in regard to the present season's cotton crop in the presidency:—

The cotton prospects for the coming season at St. Kitt's are at present very hopeful. It is estimated that the area planted is much the same as last year, viz., about 2,000 acres. In practically all cases selected local seed was planted. The young crop in all parts of the island looks healthy, and shows a vigorous growth. So far, no signs of disease have been observed and the cotton worm has made an appearance in only a few places. On one estate, where the crop was planted early, some cotton has already been picked. This however, is an exceptional case, and at the date of writing (September 4), speaking generally, the crop is at the stage of boll formation.

Attention may be drawn to the important influence of cultivation on the growth and development of the cotton plants. About three weeks ago the Agricultural Superintendent noticed a small field of cotton where the plants were affected with aphis and looked as if they wanted manure. The land was free from weeds, but the soil was in a hard condition at the surface. It was at first suggested that the plants should be sprayed with kerosene emulsion in order to destroy the aphis, and that a quick-acting manure such as nitrate of soda should afterwards be applied.

It was decided, however, to try the effect of cultivation on the plants. To this purpose a good stirring of the soil was begun; the land was kept loose with a hoe, a constant mulch of loose soil being provided in this way, and the result has been that at the end of three weeks the plants have regained a normal healthy condition, and quite lost their sickly appearance.

COTTON IN THE SEA ISLANDS.

Writing nearly a month ago (August 22), Messrs. Henry W. Frost & Co., of Charleston, reported that the condition of the American Sea Island cotton market was still dull and unchanged. Sales were slow and factors were holding cotton of 'fully fine' quality at 30c. per lb., and planters' crop lots at from 32c. to 40c. per lb.

As regards the coming crop, reports from the Sea Islands are now less promising than they were a short time ago. This is on account of the fact that the plants have taken on a second growth, which imperils the top bolls. The impression now is that the crop will not equal that of last year.

In Florida the cotton crop is reported to be generally backward. From Georgia reports are favourable except in some counties around Savannah. The reduction in the cotton area in this latter State is estimated at from 15 to 20 per cent.

Messrs. W. W. Gordon & Co., of Savannah, have sent out enquiries to about 150 correspondents in the Sea Island cotton belt, with regard to the present condition of the crop. The greater number of the replies received up to August 20 last stated that the weather experienced during the previous month had been unfavourable, and that the condition of the cotton crop might best be described as fair. The bolls were opening somewhat earlier than last season, and the promise of crop was about the average. It was evident, however, that the return would be somewhat lessened by the shedding of bolls.

THE LANCASHIRE COTTON CONFERENCE AND THE IMPERIAL DEPARTMENT OF AGRICULTURE.

As already mentioned in the *Agricultural News*, a resolution was passed at the late Cotton Conference held in Lancashire, urging His Majesty's Government to establish the Imperial Department of Agriculture for the West Indies upon a permanent basis, and expressing the opinion that with a continuance of the support so far afforded by Imperial funds, the operations of the Department might with advantage be extended so as to provide facilities for education and research work in connexion with tropical agriculture.

The following is the full text of the resolution:—

This Conference is of opinion that the rapid and satisfactory progress of the West Indian cotton-growing industry is largely due to the valuable assistance rendered by the Imperial Department of Agriculture, under the direction of Sir Daniel

Morris, K.C.M.G., and therefore strongly urges on His Majesty's Government the increasing, and indeed vital, importance of taking immediate steps to establish this Department on a permanent basis, both in the interests of the cotton industry, and for the fostering and safe-guarding of tropical agriculture generally, not only in the West Indies, but throughout the whole of the Empire. This Conference is further of opinion that the operations of the Department may with advantage be extended in the general scope and value of its work, and more particularly in the opportunities it can furnish for education in tropical agriculture, and would strongly urge that the existing grants from Imperial funds should not in any way be reduced.

This Conference would further venture to impress on His Majesty's Government that the future prosperity of the whole Empire is largely dependent on the development of cotton and other raw materials and agricultural products, and that it is essential that there should be a permanent central department for the purpose of investigation, experiment, instruction, and education, and for the co-ordination, collection, and dissemination of information, which work must be consistently and continuously carried on; and that to ensure unity of purpose in the conduct of such a Department the foundation of it must be on an Imperial basis. It is further resolved that copies of this resolution be sent to the Prime Minister, the Secretary of State for the Colonies, the Chancellor of the Exchequer, the President of the Board of Trade, the President of the Board of Agriculture, and also to the principal Chambers of Commerce and other associations.

In a letter accompanying copies of the resolution sent out, Mr. J. Arthur Hutton, Chairman of the British Cotton-growing Association, draws attention to the facts that British tropical colonies are dependent on the development of agriculture, and that it is principally by such development that their prosperity and purchasing power can be increased. This prosperity would not be limited to the colonies concerned, but would result also in considerable benefit to manufacturers and wage earners in Great Britain as well.

THE WATER PROBLEM IN AGRICULTURE.

Under the above heading there appeared in *Nature* of August 6 last, an interesting review of several papers that have lately been published in various journals dealing with the question of the conservation of the water supply on agricultural lands. This is a question which is worthy of attention in all countries, and is one of pressing importance in districts where the rainfall is frequently deficient during the growing season of the chief crops cultivated. The following extracts are given from the article in question:—

The increasing use of artificial manures and of improved tillage implements has rendered possible an increase in the amount of produce obtained from a given area of land, and attention has during the past few years been directed to another factor, viz., the water supply, which at present limits crop production in a number of cases. The amount of water actually transpired through the crop depends on too many circumstances to be stated with precision, but it may be roughly estimated at 300 lb. or more for every pound of dry matter produced, so that if 2 tons of dry matter are produced per acre, at least 600 tons of water, equal to 6 inches of rain, will be used in transpiration, quite apart from what is lost by evaporation, percolation, etc. A crop of this size is by no means excessive; indeed, in some types of intense cultivation three times as much produce would be aimed at.

In order that a large proportion of the rain-water should remain near the surface of the soil within reach of the plant roots, it is obviously necessary to reduce loss by percolation and evaporation. The practical man in dry districts has succeeded in evolving methods which go some way to doing this. The methods and implements used by the Madras cultivators are described by Mr. H. C. Sampson in the *Agricultural Journal* of India. In some districts, recourse is had to deep ploughing with a heavy plough, followed by a lighter plough, and then when the crop is up the land is hoed. In other districts the plough is the only tillage implement used. But in practically all cases the plan is to stir the surface of the soil after a rain, and to keep the top soil loose during the growth of the crop. The methods adopted in the arid regions of the United States include deep ploughing, followed by harrowing, so as to get the soil into a fine state. Harrowing is, as a rule, repeated after each rain. When the crop is up the surface soil is frequently stirred. It seems definitely established that when the top layer of soil is in a loose condition it retains water better than if it is compact, but the loose condition must be maintained by constant stirring.

The gain in water content may probably be ascribed to decreased evaporation, for water evaporates less freely from loose than from compact soil. The explanation usually given is that the movement of water in soils (apart from the gravitational flow) is a surface-tension effect similar to the rise of water in capillary tubes, and is therefore facilitated when the spaces between the particles are diminished, and impeded when the spaces are kept large. Frequent stirring of the soil, which prevents it from becoming compact, reduces the capillary movement of water to the surface, and consequently lessens the evaporation.

One of the papers dealt with in the article appearing in *Nature* is entitled 'The Loss of Water from Soil during Dry Weather,' by Dr. J. W. Leather, of the Agricultural Experiment Station, Pusa, Bengal. Dr. Leather's paper contains an interesting series of determinations of the water content in a soil at Pusa, taken to a depth of 7 feet, at varying dates during the dry season. It is shown that the water content of a cubic foot of soil at the surface fell from 18·97 lb. on September 19 to 10·41 lb. on June 15 in the following year. On the other hand, the water content in a cubic foot, taken at a depth of 7 feet below the surface fell only from 26·42 lb. to 24·00 lb. during the same period. The occurrence of occasional showers of rain during this time appears to have affected only the water content of the soil at the surface. Taken as a whole, the chief point indicated by Dr. Leather's figures, is that the rate of loss diminishes as the depth increases.

The report for 1907-8 of the Government Analyst of British Guiana states, that 973 samples of milk were officially analysed during the year. Of these, 135, or 13·9 per cent., were found to be adulterated. This represents a very satisfactory decline in the practice of adulteration, the figure being lower than any previously recorded. Last year the percentage of adulterated samples was 16·1 per cent., and in the previous year 17·4 per cent.

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EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

VOL. VII. SATURDAY, SEPTEMBER 19, 1908. No. 167.

NOTES AND COMMENTS.

Contents of Present Issue.

Lead arsenate will be tried on several estates at Barbados this year as an insecticide against the cotton worm. The advantages and disadvantages attendant upon the use of this material, as compared with Paris green, are discussed in the editorial.

An interesting article, dealing with the enzymes, or soluble fermentative agents present in the growing sugar-cane, appears on page 291.

Notes on the propagation and cultivation of the mango, a fruit to which increasing attention is being given in Cuba, will be found on page 292.

Illustrations of two interesting animals that were on view at the Barbados ploughing match are given on page 293.

The cotton prospects for the coming season at St. Kitt's are stated to be good. Reports from the Sea Islands and Florida describe the crop as being fair in condition (page 294). The full text of the resolution passed at the Lancashire Cotton Conference re the Imperial Department of Agriculture is reproduced on the same page.

Attention is drawn to two articles on pp. 298-9, dealing respectively with Palm Trees and Their Uses, and with Cacao Cultivation in Samoa.

An account of the agricultural work carried on in connexion with the Barbados Industrial School during the season 1907-8 appears on page 301.

Feeding Cotton-seed Meal to Hogs.

In further reference to the question of feeding cotton-seed meal to hogs, concerning which an article appeared in the last issue of the *Agricultural News*, and in view of past experience at Barbados and in other West Indian Islands, it has been thought advisable to give a word of warning on the subject.

The experiments referred to in the previous article, in which small quantities of cotton-seed meal, mixed with maize meal and other foods, were fed to pigs for varying periods, without apparent harm, were carefully conducted at American Agricultural Experiment Stations, by scientific officials, who themselves supervised the preparation of the mixture of foods.

No reports have yet been received as to the successful repetition of the experiments in ordinary estate practice, and if any stock-owner in the West Indies should think of making a trial in feeding cotton-seed meal to his hogs, this should not be left to the management of the man who usually feeds the animals, but should be carefully carried out under the supervision of an overseer, who should personally see that the small quantities of cotton-seed meal mentioned are not exceeded.

It is probable, however, that on the majority of estates in the West Indies, a sufficient number of profitable uses for cotton seed and cotton--seed meal will always be found, apart from feeding it to hogs—a use which, unless conducted with the greatest caution, is bound to be attended with rsik to the animals concerned.

Ginger Production in Jamaica.

Although ginger is now produced in considerable quantity in China and other parts of Asia, the Jamaica product still holds a good place on the market, and is justly appreciated on account of its superior quality.

The ginger crop of Jamaica is grown chiefly in the southern portion of the island, and is mainly produced by peasant cultivators The plant is propagated by setting out cuttings or divisions of the rhizomes or underground stems, care being taken that each cutting planted shall possess at least one bud. In cultivating the crop it is important that the ground should be well tilled, and that a suitable manuring be given. March and April are the best months for planting in Jamaica ; the crop blossoms in September, and is ready for gathering in the following January or February. In forking or digging the rhizomes, or 'hands' as they are termed, from the ground, care must be taken not to injure or bruise them in any way.

The fibrous roots, and adhering earth and other matter, are removed from the 'hands,' which are scalded for some minutes in boiling water, and afterwards dried in the sun, when they become the ginger of commerce.

The Jamaica ginger crop of 1907-8 was a short one on account of drought. About 1,400,000 lb. were exported from the island, of which the United States took approximately 650,000 lb., and Great Britain 600,000 lb. The balance was shipped to Canada.

Production and Uses of Annatto.

Annatto is the orange-red colouring matter which occurs as a layer of pulp on the outside of the seeds of *Bixa orellana*, a small tree native to Central and South America, and now cultivated on a commercial scale both in the West and East Indies.

This product is largely used in many countries to impart a yellow colour to such articles of food as butter, margarine, and cheese. It was formerly used for dyeing silks, but is now little employed for this purpose.

The annatto plant is largely grown in Jamaica, more especially by small holders. The exports of this product from the island have largely increased of late years. In 1882, the shipments were 147,000 lb., while in 1905-6 they reached 457,248 lb. Owing to the drought of 1906-7, the Jamaica crop was much curtailed, and the exports fell to 290,573 lb., of which 204,730 lb. went to the United States.

Annatto seeds may be first collected when the plants are about eighteen months old, but a full crop will not be obtained within three or four years from the time of sowing. Growers sometimes prepare the dye themselves by treatment of the seeds with hot water, and subsequent evaporation of the liquid, the dye being exported in the form of a paste. In most cases, however, the seeds themselves are shipped abroad, and the dye is prepared in Europe or America. At present the average price of annatto seed is about 4*d.* per lb.

Dominica Limes at the Canadian Exhibitions.

Particulars have been given in recent issues of the *Agricultural News* of the samples of produce and other articles that have been forwarded to the Toronto National Exhibition by Barbados, St. Lucia, and British Guiana. Dominica is also taking part in the exhibition, but it was considered advisable, by the Permanent Exhibition Committee, to limit the articles sent, to limes and lime products only, and to concentrate all efforts on making a really good collection in this line.

The produce was forwarded to Toronto from Dominica on July 27, by the C.L.S. 'Dahomé,' and comprised 14 boxes and 1 barrel of green limes, 16 bottles of raw, and 5 bottles of concentrated lime juice, 3 bottles of citrate of lime, 4 bottles of distilled lime oil, 1 bottle of otto of limes, and 1 bottle of hand-pressed lime oil. Bundles of cocoa-nut leaves and a case of Roseau plumes were sent at the same time to serve as decorative material in arranging the exhibits.

Eight large crates of green limes were also forwarded by the 'Oruro' on September 1, for display at the Ottawa Exhibition, which will be held this month.

Fruit for exhibition was supplied by the owners of the St. Aroment, Hillsborough, Geneva, Lisdara, Everton, Clark Hall, Bath, Wall House, Ancastor Park, Canefield, and Castle Comfort estates, and the Dominica Fruit Growers' Association, while the Botanic Station and Agricultural School also contributed.

Young Cotton and Old Cotton.

The Imperial Department of Agriculture has always recommended to planters that old cotton plants from the crop of the previous year, should be entirely cleared from the estate before the young crop is sown. By this means the danger of infection to the young plants with scale insects and other pests from the old cotton is removed. The wisdom of this course has been abundantly proved by experience. In St. Croix a law has been passed which makes it compulsory for growers to pull up and burn their cotton plants as soon as the second picking has taken place. Legislation of a similar nature has been under consideration in the Leeward Islands but up to the present no law has been passed on the subject.

In spite of the above considerations, old cotton is sometimes noticed at Barbados and in other islands, growing side by side with the young seedling crop. The former is retained for the sake of the third picking, and in many cases, no doubt, the monetary returns obtained seem, for the time, to justify the practice. Planters should, however, consider whether the profit so gained is not balanced by the risk to which the young cotton on the estate is exposed, especially when it is considered that the lint from the third picking is usually, if not always, much inferior in quality. The practice has undoubtedly in some cases, resulted in the destruction of at least a portion of the growing crop.

Rubber from Trinidad.

A collection of rubbers prepared in Trinidad from trees growing on lands belonging to the Botanical Department, or on private estates, was forwarded some time ago to the Imperial Institute, London for examination and valuation, and the report on these samples is published in the latest issue of the *Bulletin* of the Institute (Vol. VI, No. 2).

Para rubber, the product of two trees just over 30 years old, was forwarded in biscuit, ball, and scrap form. The biscuits were reported on as well-prepared, and were valued at from 4*s.* 11*d.* to 5*s.* 1*d.* per lb., at a time when Para biscuits from the East commanded a price of from 5*s.* 1*d.* to 5*s.* 7½*d.* per lb.

Twelve samples of Castilloa rubber, in block, sheet, and scrap forms, from trees of varying ages, were forwarded. The chief point noticeable from a consideration of the results of analysis of these rubbers is the large amounts of resin present, which considerably depreciated the value of the product. Two samples (block), the produce of trees 7½ years old, contained 37 and 52 per cent., respectively, of resin. Another sample, possessing good physical properties, and from a tree 17 years old, contained 23 per cent. of resin. This proportion is much higher than that usually recorded for Castilloa rubber from mature trees. The values placed upon the sheet Castilloa rubbers sent varied from 2*s.* to 4*s.* 6*d.* per lb., the highest figure being obtained for rubber the product of trees only six years old. The samples of scrap Castilloa rubber sent were estimated to be worth from 2*s.* 1*d.* to 3*s* per lb.

PALM TREES AND THEIR USES.

The great value of different species of palms to dwellers in the tropics is well known, and the special uses which different members of this family serve are discussed in the May number of *Tropical America*.

The variety of palm which first receives attention is the cocoa-nut (*Cocos nucifera*), probably the commonest and most useful of all the palms. As is well known, this tree flourishes best on sandy sea-beaches, and this no doubt accounts for its wide distribution, since the cocoa-nuts falling from the tree into the sea have been carried long distances and finally washed up on beaches, where they have germinated. The young seedling grows readily, and its roots soon get a firm hold on the soil.

The stem of the cocoa-nut palm is very strong and tough, and is composed of closely interwoven fibres in a hard and almost horny outer bark. The tree commences to bloom when from three to ten years old; it comes into full bearing at about eleven or twelve years old, and yields continually until from 80 to 100 years of age.

Every part of the cocoa-nut tree is made to serve some useful purpose. The trunk is used for posts, fences, and in building houses, the leaves form a thatch for houses, and bedding for horses and cattle, while door-mats, coarse cloth, etc., are manufactured from the fibre of the husk. Cocoa-nut milk is a very refreshing drink, and the dried meat of the nut forms the copra of commerce, while the expressed oil is valuable for cooking purposes as well as for soap manufacture. Further, when fermented and distilled, the sap of the cocoa-nut tree furnishes the alcoholic drink known in the East as 'arrack.'

The Royal palm (*Oreodoxa regia*) is probably the most graceful and beautiful of all the members of the family. The full-grown tree sometimes reaches 80 or even 100 feet in height.

The cabbage palm (*Oreodoxa oleracea*) is nearly allied to the Royal palm, and from it is obtained the 'mountain cabbage.' This consists of the heart portion of the crown before the young leaves composing it have unfolded. Its removal causes the death of the tree. As in the case of the cocoa-nut palm, the trunks of the Royal and cabbage palms are used for building dwellings, while the leaves are employed for thatching the roofs. The fruit of these palms consists of bunches of small purple or dark-green berries, which are much used in making preserves and pickles.

Other useful species which resemble the Royal palms and are related to them, are the trees known in St. Vincent and Dominica as 'gru-gru' and 'maho' respectively. As with the Royal and cabbage palms, the trunks of these latter varieties are used for building purposes, while from the leaves of the maho palm, waterproof baskets are woven by the Caribs, and they are also utilized in the manufacture of sieves through which cassava meal is grated.

Another class of palm of which the Talipot (*Corypha umbraculifera*) is the largest and most remarkable, is stout and bushy in appearance, while the leaves are large and fan-shaped. The common palm-leaf fans are made from the foliage of these trees and in many parts of the West Indies, notably in Porto Rico and San Domingo, the leaves are manufactured into hats, baskets, bags, trays, etc. The leaves of the Talipot palm on attaining maturity, which does not occur until the tree is about thirty years old, are 8 or 10 feet long by 12 or 14 feet in width.

The date-palm (*Phoenix dactylifera*) is another most useful member of the palm family. It is a native of Africa and south-west Asia, but has been introduced into Tropical America and the West Indies. A date palm at the Dominica Botanic Station yielded fruit of very good quality last season.

From the ivory palm of Colombia (*Phytelephas macrocarpa*) (see *Agricultural News*, Vol. VII, p. 58), the vegetable ivory of commerce is obtained. When young the seeds or nuts are filled with a milky fluid that later hardens into a firm, fine-grained albuminous substance, which for many purposes has all the requirements of animal ivory.

PREPARATION OF PLANTATION RUBBER.

In consequence of the uncertainty which still exists as to the best methods of preparing plantation rubber for the market, an abstract of a circular on the subject issued some time ago by Messrs. Lewis & Peat, rubber brokers of London, may not be without interest.

Messrs. Lewis & Peat state that they have lately received consignments of rubber biscuits from Ceylon and other countries in a heated and sticky condition. This may be due in some part to the fact that the latex was taken from very young trees, but is more often owing to defective preparation, more especially the extraction of too much moisture. Bacteria are frequently the direct cause of bringing about an unsatisfactory state in prepared rubber.

It is pointed out that the smoked rubber from Brazil, prepared in the same manner as has been practised for the past fifty years, still continues to be the best quality on the market, on account of its elasticity and durability. These qualities are thought to be due to the process of fumigation with smoke from nuts of various tropical trees which the latex undergoes in preparation. The fumes have an antiseptic action on the rubber, and prevent the development of bacteria which are, in many cases, responsible for the deterioration of the product. The fumes of such antiseptic agents as creosote, corrosive sublimate, etc., may be used in preparing the rubber, with undoubtedly beneficial results on the character of the latter.

It has been mentioned that the extraction of too much moisture tends to bring about deterioration in rubber, and this is more especially seen in connexion with the elasticity of the product, which is much reduced. It is also noticed that rubber of this character becomes soft and sticky if left shut up for some time, or if it is exposed to a high temperature.

On the other hand, if an excess of water remains in the rubber decay is liable to take place, and fumigation of the product is recommended.

To ensure good results, planters are advised by Messrs. Lewis & Peat to treat their rubber with an antiseptic agent, either by adding a small amount of the latter material direct to the latex, or to submit the latex to the fumes of the disinfecting agent. It is also recommended that rubber be prepared in the form of thin sheets rather than in blocks or biscuits.

It is stated that acting under the above advice, smoked rubber from several Ceylon estates has been sent to England, but it is not yet known whether this product has commanded a higher price than that prepared without the use of antiseptic agents. Since the adoption of the fumigation process would cause a small amount of extra expense and labour, the majority of planters are waiting to see the results of these first trials before they themselves take it up.

CACAO IN SAMOA.

That the cacao produced in the German colony of Samoa is of excellent quality is proved by the fact that at the end of 1907 it commanded a price of 110*s.* per cwt. on the London market. The two varieties of cacao cultivated are the Forastero and the Criollo, but the good reputation of the Samoan product is stated to be due to the Criollo. In his latest report the British Consul at Upolu discusses at considerable length the question of cacao cultivation in the Samoan islands, and gives much interesting information in regard to the characteristics of the two varieties grown. These particulars, the Consul mentions, were largely obtained by him from articles written on the subject by Dr. P. Preuss, and which appeared in the *Tropenpflanzer.* The following extracts are quoted:—

Cacao trees in Samoa begin to bear after the fourth year and mature about the seventh or eighth year, when the yield should be 6 cwt. yearly per acre.

Dr. Preuss has no doubt that the real home of Samoan cacao is Venezuela and that the Venezuelan Criollo has certainly undergone changes in the course of time in Java, Ceylon, and Samoa. The husks are mostly rougher and more bulky at the point, and the beans are smaller and shorter. The colour of the nibs has mostly become white, whilst in Venezuela, at least with the red-shelled fruit, it is mostly whitish violet. The principal difference, however, between Samoan and Venezuelan Criollo is in the taste and aroma. In this no cacao in the world can equal the pure Venezuelan Criollo. In Ceylon and Java these two properties influencing the value of cacao have gone back. Samoan cacao has lost some of its aroma, but when really well prepared is, he says, 'the nearest to Venezuelan Criollo in taste.'

The beans of the Samoan Criollo are of the same shape as those of the same variety in Ceylon and Java, but, according to Dr. Preuss, there appears to be a difference in the colour of the nibs in a fresh state, the colour of Samoan Criollo being ordinarily pure white—not violet-coloured as in Ceylon or Java.

The colour of properly prepared and dried Samoan cacao beans is glossy brown with a reddish tint. When whitish brown spots are found, as also in Java, it reduces the value of the product.

The taste of well prepared Samoan cacao is mild, but at the same time vigorous. The aroma is fine although not very strong. Dr. Preuss states that the Trinidad Forastero variety was introduced into Samoa from Ceylon. As regards the two varieties (Criollo and Forastero) one is easily distinguished from the other by the difference in the hardness of the shell. Criollo can be cut through smoothly and easily. Forastero, except where it is a cross with the former, has a very hard shell which it is very difficult to cut with a knife. The former, too, will be identified by the white colour of its nibs.

Samoan Forastero is undoubtedly superior to Trinidad Forastero because its beans are fuller, its break looser and its taste milder. It will become still more superior when Samoan planters have come up to the Trinidad planters in the culture of the tree and the preparation of the product. At times Forastero fetches very good prices, and mixed with Criollo it occasionally fetches as much as pure Criollo.

Although the difference in price between the two kinds is not very great so far, one must consider that up to the present, fancy prices have been paid for Samoan cacao since the quantities offered have been very small. As soon as large quantities are put on the market it is certain that the buyers will make a sharper distinction between the two qualities, and that Criollo will then be valued considerably higher than formerly. When the market is unsteady Criollo will not suffer as much as Forastero.

The Criollo variety can only be successfully cultivated in very fertile soil—virgin forest soil is to be preferred. Forastero will flourish and yield good crops on less fertile soils. On other grounds, Forastero is favoured by its greater vitality, stronger growth, greater productiveness, less demand for shade, easier cultivation (and some say its greater resistance to disease, though this is disputed). The only thing in favour of Criollo is the excellence and superiority of its fruit.

A planting distance for Criollo of 13 feet by 13 feet, or at the farthest of 13 by 14½ feet, is proper. That gives 250 or 220 trees to the acre. Forastero should be planted 16½ by 16½ feet. On very good soil two trees may be planted in one hole; it increases the yield considerably. This holds good for both Criollo and Forastero.

All the planters in Samoa appear so far to be tolerably well satisfied with cacao returns, but like everything else the crop requires careful attention in order to give the best returns. Large plantations, if well managed, and not crippled by want of labour, ought certainly to do well and return good dividends. The same thing applies to those small plantations from 20 acres upwards where the owner lives and personally directs them, but when the estate is too small to afford the payment of a proper manager, and the owner himself, having more important things to attend to elsewhere, cannot live on the land, failure is sure to follow. Cacao cultivation requires perhaps more personal attention by the planter or manager than any other tropical product, not merely to bring the trees to maturity, but to look after them and crop them when they can bear fruit.

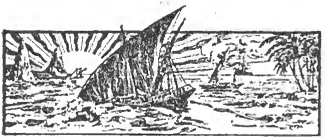
EXPORTS FROM BRITISH GUIANA.

The trade returns of British Guiana for the period from January 1 to September 2 of the present year contain several items worthy of note.

There has been a small falling off in the shipments of sugar and sugar products as compared with the corresponding period of last year. The sugar shipped in the first eight months of 1907 reached 46,555 tons, while for the same period of 1908 the quantity exported was 45,953½ tons. Rum exports fell from 1,036,844 gallons in the first eight months of 1907 to 958,133 gallons in 1908.

On the other hand there have been some noteworthy advances. For instance, from the beginning of 1908 up to September 2, 1,750 tons of rice meal have been exported as compared with 144 tons for the same period of 1907. Citrate of lime shipments have increased from 380 lb. to 1,235 lb., and the exports of cacao from 57,845 lb. to 90,026 lb.

The figures relating to the exports of shingles from the colony are very satisfactory, no less than 2,258,950 having been shipped up to September 2 of the present year, as against 1,115,900 in the same period of 1907. Rice, rubber and cattle, too, all show increases this year in the quantities exported up to date. Rice shipments have advanced from 4,370,134 lb. in the first eight months of 1907 to 5,858,434 lb. in the same period of 1908. The rubber shipped has increased from 3,032 lb. to 4,531 lb., while the exports of cattle have been 833 head for the eight months of 1907, and 1,051 head up to date in the present year.



GLEANINGS.

A new ship intended for the Jamaica banana trade, and capable of transporting 60,000 bunches of bananas, is being built at Glasgow for Messrs. Elders & Fyffes, Ltd.

The Department of Science and Agriculture of British Guiana distributed 7,000 lb. of seed-paddy of good varieties, free of charge, to bona fide cultivators of rice in the colony, during the period from October 1, 1907, to March 31, 1908.

There were shipped from Trinidad by the R.M.S. 'Tagus,' which left for Southampton on September 7, 314 bags of copra, 41 bags of cacao, 400 bags of cocoa-nuts, and 3,252 bunches of bananas, all the produce of the island.

Reports from St. Croix state that cotton cultivations in the island are looking very promising. Planters are evidently giving a good deal of attention to the crop, since the fields are reported to be free from weeds, the soil well cultivated, and the cotton plants in a vigorous condition.

Eighteen samples of rubber and balata have been forwarded from British Guiana to the International Rubber Exhibition that is being held this month in London. The rubber is for the most part from trees of the native *Sapium Jenmani* species, and has been sent in biscuit, ball, and block forms.

The correspondent of the British Board of Trade at Durban, Natal, reports that a factory for the manufacture of starch from sweet potatos has been erected near that city. This factory is capable of a daily output of 3 tons of starch from 12 tons of sweet potatos. The pulp remaining is fed to cattle.

In order to advertise Dominica limes in England, the Permanent Exhibition Committee of the island are forwarding by the Royal Mail steamers each fortnight, a crate of green limes, consigned to Mr. A. E. Aspinall, Secretary of the West India Committee, who will distribute the fruit in suitable quarters. A sum of £15 has also been forwarded to Mr. Aspinall, to be spent in advertising the fruit.

Bee-keeping is carried on with great success at the Industrial School, Onderneeming, British Guiana. During the year 1907-8, the amount of honey extracted from eleven hives was 1,147 lb., as compared with 1,075 lb. yielded by the same hives in 1906-7. The honey was sold for $177·76, and as the expenses are small, the industry is remunerative.

The coffee exports from Brazil for 1907 exceeded those for 1906 by some 1,714,372 bags, or in value by £902,840, the actual figures being 15,680,172 bags, valued at £28,559,063, as compared with 13,965,800 bags, valued at £27,615,883, in 1906.

The sugar-cane crop of Madeira for the year 1907 was the largest on record. It represented a sugar yield of 45,000 tons, having a value of £170,000, as against 33,000 tons, with a value of £125,000, produced in 1906. The amount of sugar actually produced in 1907 however, was only 21,000 tons, the remainder of the canes being utilized in the manufacture of cane brandy. (British *Consular Report.*)

Experiments carried out by the Director of Agriculture, Madagascar, to test the most favourable position in which cocoa-nuts should be planted in order to ensure germination, showed that the best results were obtained when the nuts were planted horizontally, or with the pointed end turned slightly downwards. The most unsuccessful results were given when the nuts were planted vertically with the points either upwards or downwards.

Cane planting for the 1909-10 crop is now in progress on Trinidad sugar estates, and the *Port-of-Spain Gazette* reports that a considerable area was completed during the fortnight ending September 5. In certain parts of the south, estate owners complain of the difficulty of finding sufficient labour for their estates, and in these districts, as in British Guiana, the labour difficulty is in large part attributed to the increased attention given to rice growing by the East Indians.

The soil and climate of the French colony of the Society Islands are eminently suited to the production of vanilla of high grade, and in 1907 this product was exported to the value of £28,257, as compared with £21,659 in the previous year. Very little attention is given to the industry, however, and the vines grown are of an inferior variety. The curing process is carried out chiefly by Chinese shop-keepers, who export the produce to San Francisco.

A Departmental Committee appointed to enquire into the condition of agricultural education in England and Wales has lately issued its report. One of the sections of this report draws attention to the fact that for the proper development of British tropical and sub-tropical colonies, a number of agricultural experts are required, and it is pointed out that the establishment of a Readership or Lectureship in Tropical Agriculture at one or more of the British Universities would greatly aid in the provision of suitable men.

Notice has been given by the Royal Mail Steam Packet Company that it intends to remove the coasting steamer 'Yare' from Dominica, since the vessel does not pay working expenses. At a late meeting of the Dominica Agricultural and Commercial Society the opinion was strongly expressed that the removal of the steamer would be a great set-back to many industries and enterprises lately started in the island, and a resolution was unanimously passed, urging the Government to increase the subsidy at present given, if necessary, in order to ensure the running of a passenger and cargo steamer along the coasts of the island.

AGRICULTURAL WORK AT THE BARBADOS INDUSTRIAL SCHOOL.

A detailed account of the agricultural work carried on in connexion with the Industrial School at Barbados, appears in the report for 1907-8 of that institution.

Two plantations are worked by the boys at the school, Dodds and Summervale respectively. The area planted in sugar-canes at Dodds estate for the crop of 1908 was 23½ acres. The crop reaped in 1907 gave an average return, the canes reaped representing a yield of nearly 2 tons of sugar per acre. At this plantation, where the school is situated, the greater portion of the land planted in sugar-cane is given over for the purpose of experiments with different varieties of cane, and manurial trials, carried on under the direction of the Imperial Department of Agriculture. At Summervale plantation the area planted in canes for the crop of 1908 is 30¼ acres. In 1907 the average crop of canes reaped was 22 tons per acre. This represents a return of a little under 2 tons of sugar per acre.

In 1907 for the first time canes were sold from the Industrial School plantation to a neighbouring factory instead of being worked up on the estate. It has been arranged that the price paid for the canes shall vary with the market price of sugar. The buyer agrees to pay 11*s.* per ton of cane when the price of dark crystals is $1·85 per 100 ℔. in the local market, and when it takes 11 tons of cane to make 1 ton of dark crystal sugar. The cost of delivering the canes from the plantation to the factory was shared by the seller and the buyer.

During the 1907 season the price realized per ton of canes was 13*s.*, approximately. This was considered satisfactory, as the canes were somewhat under average in quality, and also in view of the fact that at the time the price of dark crystal sugar ranged between $1·97 and $2·30 per 100 ℔. Since the price obtained for the canes sold in this way depends in chief part upon the amount of sucrose yielded, it is evident that the provision of superior crushing machinery at the factory, which would ensure higher extraction, would result in a higher price being paid to the grower.

At Dodds estate in 1907 about 3 acres were planted in Sea Island cotton. The yield obtained was not a high one, but the lint commanded a satisfactory price. At Summervale plantation about 30 acres of cotton were reaped in 1907, and the price of about £13 per acre was obtained for the lint. Most of the seed was fed to the oxen. Although the crop was grown under unfavourable weather conditions, and was severely attacked by pests of various kinds, the result was still financially remunerative. Attention is drawn in the report to the fact that there has been a deterioration in the amount of seed-cotton yielded per acre each year since 1905. While the average figure in the later year was about 1,100 ℔., in 1906 it was about 915 ℔., and in 1907 only 590 ℔. This suggests a probable deterioration in the seed, and emphasizes the importance of selecting and growing only the very best seed, with a view to improving both the quality and the quantity of the lint.

A fairly large area of provision crops, such as sweet potatos and yams, were grown at the school. Twenty-four acres of sweet potatos planted in 1906 realized £7 16*s.* per acre. A slightly smaller acreage was planted in 1907. The crop suffered from attack by the larvae of the potato beetle, which undoubtedly caused a shortage in the return. About 9 acres of yams were also planted, the value of the return being about £9 per acre, as compared with £12 per acre in 1906. The Superintendent of the Industrial School remarks that the yam crop is one that deserves more attention than is generally paid to it in Barbados.

During the year the system was continued of allotting to the boys small garden plots for cultivation during their play hours. The results that have been obtained are satisfactory, and the boys usually earn small sums of pocket money from the vegetables grown on these plots and afterwards sold. These vegetables include eschalots, beans, ground nuts, melons, etc.

Some labour-saving implements have been obtained during the season reported on, since the boys were unable themselves to carry out all the work on the plantations. The implements purchased are 2 seed planters, 1 potato digger, and 3 mould board ploughs, at a total cost of £13 8*s.* 4*d.* These implements have not been on trial for a long period, but it may be said that the 2 seed planters have so far proved entirely satisfactory. One is a miniature plough with seed box, and can be drawn by a mule or donkey. It cuts the furrow and drops and covers the seed, all at the same time. This implement, which was obtained as a second-hand one from Messrs. H. E. Thorne & Son, Ltd., planted practically the whole of the cotton crop at Summervale plantation, and not only saved labour, but it was pleasing to see the regular spring of the seed: two boys were employed in working it when drawn by a mule. The other seed planter has also been a success for planting cotton. This is a small machine which will, if properly handled, plant cotton more effectively and cheaper than is usually done on plantations.

The potato digger is being made good use of and saves labour considerably where, as is the case here, potatos have to be dug for consumption at the institution.

The mould board ploughs have also been used in making furrows for turning in green dressing and farmyard manure, and in this way they save manual labour.

It is hoped with implements of this sort, not only to try and improve the methods of cultivation, but also to cheapen the cost, and at the same time to turn the labour of the boys to better account, and reduce expenditure in hired labour.

INCREASING CAMPHOR PRODUCTION.

A considerable amount of interest has of late been shown in camphor cultivation by planters in certain British colonies, and the latest issue of the *Bulletin* of the Imperial Institute (Vol. VI, No. 2) contains a short article reviewing the recent advances that have been made in the production of this article.

In 1907 the world's consumption of camphor was estimated at about 10,600,000 ℔. About 70 per cent. of this quantity was utilized in celluloid manufacture, 15 per cent. in the preparation of disinfectants, etc., 13 per cent. in medicinal preparations, while the remaining 2 per cent. was utilized in the manufacture of explosives.

The area under camphor cultivation in Ceylon is extending, and plantations of the camphor laurel have of late years been established in the Federated Malay States. In the United States experiments in the growth of the tree are in progress in Michigan, Florida, and California. India and German East Africa are other parts of the world in which it is hoped to develop a camphor industry.

Increasing supplies of the product, too, may be expected from China and Japan. Formosa has in the past been the chief source of supply, and in 1907 produced 5,388,918 ℔., as against 4,040,838 ℔. in 1906. The progress that is being made in China in this connexion may be judged from the fact that while the exports from Foochow in 1905 amounted to 4,805 cwt., they had increased in 1906 to 13,585 cwt.

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LIVE STOCK INSURANCE.

The insurance of live stock is more or less general throughout European countries by small tenant farmers as well as by large landed proprietors. In different parts of England small proprietors in a given district sometimes effect among themselves a mutual system of insurance of their domestic stock by the formation of what are known as 'cow clubs' or 'pig clubs.' These 'clubs' are really co-operative societies, each member being the owner of one or more head of live stock.

A small entrance fee is charged for each animal insured, and the annual subscription is payable in four quarterly instalments. Most societies demand that animals accepted for insurance shall be marked in such a way that they can be readily identified. The value of the cow or pig as a healthy animal is fixed, and in case of death, it is usually arranged that the owner shall receive 75 per cent. of this value.

Taking a representative club of this kind in England it may be mentioned that the entrance fee for the insurance of the first cow is 2*s.* 6*d.*, and 1*s.* for each subsequent cow. The annual subscription is 6*s.* per cow per annum. Hence, after the first year the cost of insurance of three cows would be 18*s.*, while the value of the animals might be any sum between £36 and £65. In the case of pigs the entrance fee is usually fixed at 1*s.* and the subscription at 1*d.* per week for each animal.

According to the *Natal Agricultural Journal*, efforts are being made to introduce a mutual live stock insurance system into South Africa, and it may be pointed out that the advantages of such a scheme are well worthy of the attention of Agricultural Societies and other bodies in the West Indies. These advantages would naturally appeal most strongly to the small proprietor, who possesses but one or two head of live stock.

As already mentioned, co-operative societies for live stock insurance are widespread in many European countries. In Holland, these societies have grown up without official intervention or State aid; in France, however, mutual insurance has only gained ground since the State began to foster and encourage it.

Since the mutual system referred to appears to have developed to a greater degree in Holland than in any other country, it may be worth while to reproduce from the *Natal Agricultural Journal* the particulars given relating to that country:—

The insurance of live stock in Holland has been very generally adopted in the districts where small breeders predominate, and although attempts to centralize the local associations have been made at different times, these have not met with any success. The advantages of the local over the central type are held to consist in its inexpensive administration, which is usually quite honorary, and in the control which members can exercise over each other when the operations are limited to a small area.

In 1906 there were 377 societies for the insurance of horses, having 30,447 members, and involving 56,814 animals. The number of cattle societies was 748, with 72,797 members, insuring 273,099 animals. There were 56 pig societies, the membership of which extended to 4,357, with 9,096 pigs insured; and there were 55 sheep and goat societies, having 3,857 members and accounting for 6,362 animals. The percentage of animals lost during the same year in each of these four classes was: horses, 3 per cent.; cattle 1·9 per cent.; pigs 6 per cent.; and sheep and goats 7·7 per cent.

The societies are usually confined to a very limited district, and it is thus possible not only for all members to know each other, but also for the cost of management and administration to be reduced to a minimum. An objection to the small area covered by a society, however, is that in the event of great mortality, such as an epidemic of contagious disease, it may get into difficulties, and many of the societies do not undertake to pay compensation in such cases.

Various provisions are made to prevent fraud, and no compensation is paid if the death of the animal is attributable to neglect. Only healthy cattle are insured, and many societies oblige the members to consult a veterinary surgeon in case of sickness among the cattle, and to give notice to the management. Further, various provisions are found with respect to the payment of compensation for certain diseases. Thus it frequently happens that no compensation is paid for cows which die of a second or third attack of milk fever, or for animals which die of anthrax in a meadow where a case of this disease has occurred shortly before.

CITRONELLA OIL.

The cultivation of citronella grass (*Andropogon nardus*) is carried on largely in Java, the Malay Peninsula, and Ceylon, for the sake of the essential oil which is yielded on distillation.

On good soil and with a heavy rainfall, the grass grows very quickly, and several cuts per annum can be taken, the total return in the best cases being about 5 tons per acre per annum. The grass yields from 0·6 to 0·7 per cent. of its weight of oil, or from 67 to 78 lb. of oil per acre per annum. The price at present is very low—no more than 1*s.* 2*d.* per lb.—which would at the best, represent a return of no more than £4 11*s.* per acre; but this is undoubtedly only a temporary state of affairs. Not long ago the price was 1*s.* 9*d.* per lb.

The grass lasts twelve years before re-planting is required. The plant required for distilling the oil from the grass is necessarily somewhat expensive at the start, but it is estimated that an apparatus capable of dealing continuously with the grass from 200 acres of land may be installed at a cost of £335.

In Java citronella is grown chiefly as a catch crop between cacao, cocoa-nut or rubber trees, and it is stated that the profits from this crop are sufficient to pay the cost of maintaining a young rubber or cocoa-nut plantation until the trees begin to bear.

The *Bulletin de la Chambre d'Agriculture de la Cochinchine* (No. 10, 1907) contains an account, written by an official of the Cochin-China Department of Agriculture, of the production of citronella oil in the District of Johore, Malaya. One of the distilling plants visited was installed in a shed built obliquely on a slope. A boiler, which was capable of supplying an engine of 20-horse power, provided the steam for the distillation and for driving a pump for the cooling water. There were two stills, each of which was capable of dealing at once with 330 lb. of citronella grass. The condenser consisted of a box of rather more than a cubic yard capacity, lined with zinc, in which the worm was placed which, issuing from one side of the box, ended over a Florentine flask, intended to receive the oil. Both stills were operated simultaneously; a distillation of 660 lb. citronella grass, lasting about two hours, yielded about 0·69 per cent. of oil, or very nearly 4½ lb. It is calculated that each acre yields from 10 to 12 tons of citronella grass, and the net profit is estimated at between £3 and £4 per acre per annum.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of July :—

As usual at this season of the year, the drug and spice markets during the month of July have been very quiet. Though the holiday season begins to take effect in July, it is not till August that it is in full swing, but the fine, hot weather of the former month had a decided influence in causing trade generally to become inactive, and though there has been at most of the auctions throughout the month, good supplies of both new and old goods, the general demand has been slow, and in consequence, prices for the principal articles associated with West Indian trade, show very little alteration from those of June.

GINGER.

At the first spice auction which took place on the 1st of the month, 623 packages of Jamaica were offered, 4 barrels of ordinary dark, slightly mouldy, finding purchasers at 51*s.* per 100 lb., all of the remainder being bought in. Seven hundred and twenty-three packages of Cochin and Calicut were also offered, 34*s.* per cwt. being paid for 140 bags of fair, plump, washed, slightly wormy, Cochin. A week later the offerings of Jamaica amounted to 203 packages, but no bid was made either for this kind or for Cochin or Calicut. On the 15th, only 47 barrels of Jamaica were offered, and 8 sold at 59*s.* for good ordinary, and 51*s.* for ordinary small. All the offerings of Cochin, which amounted to about 500 bags, were bought in at 35*s.* to 36*s.* for washed rough. One hundred cases of good, brown, rough Calicut were also bought in at 45*s.* per cwt. On the 22nd, some 124 packages of Jamaica and 39 packages of Cochin and Callicut, were brought forward, for none of which was there any demand, and all were withdrawn. At the last auction on the 29th, the market stood thus : out of 120 packages of Jamaica offered, only a few were sold at from 53*s.* to 54*s.* for good common. Of Cochin and Calicut, nearly 600 packages were offered, and nearly all bought in at the following rates : bold, selected cut, 90*s.*; unsorted native cut, 55*s.* to 57*s.* 6*d.*; fine, bold, round, washed, Cochin, 40*s.*, and washed rough, 34*s.* to 36*s.* One hundred and ten bags of fair, limed Japan were also brought forward at this sale, and withdrawn at 30*s.* per cwt.

NUTMEGS, MACE, AND PIMENTO.

At the spice sale on the 8th. 213 packages of West Indian were offered and sold at 1*s.* 7*d.* for 55's.; 1*s.* for 62's. to 63's., and the smaller sizes at somewhat easier rates. Some boxes and cases from Singapore and Ceylon were disposed of at lower rates. On the 15th, 500 packages of West Indian were offered and all sold, the large sizes at firm prices, and the smaller at easier rates. At the last auction on the 29th, the offerings, amounting to 120 packages of West Indian, were all sold at similar rates. At the auction on the 8th, all the offerings of West Indian mace, amounting to 33 packages were sold at the following prices : 1*s.* 6*d.* to 1*s.* 8*d.* for good to fine pale ; 1*s.* 3*d.* to 1*s.* 5*d.* for fair, and 1*s.* 1*d.* to 1*s.* 2*d.* for ordinary. A week later, 105 packages were brought forward, and all disposed of, at steady rates, good pale, partly picked, fetching 1*s.* 5*d.* to 1*s.* 6*d.*; fair, 1*s.* 3*d.* to 1*s.* 4*d.*, and broken ordinary to good, 7*d.* to 1*s.* 1*d.* per lb. At the last auction on the 29th, the quotations for 4 packages West Indian were : for fair reddish, 1*s.* to 1*s.* 2*d.*, and broken, 10½*d.* Some bold reddish Penang fetched 1*s.* 10*d.* at this sale. Of Pimento, 150 bags were offered at the spice sale on the 8th, and all bought in at 2⅛*d.* per lb. for fair. On the 22nd, 130 bags were sold out of a total of 280 offered, 1⅞*d.* being paid for mixed blacks, and 2*d.* for barely fair. A rather firmer tone prevailed at the last sale of the month, but most of the offerings were bought in.

ARROWROOT.

Very little business has been done in this article, but it was reported that a large crop had been planted in the West Indies for the coming year, and that future supplies would be abundant.

SARSAPARILLA.

At the first drug sale on the 2nd, 31 packages of grey Jamaica were offered and sold at the following rates : for good, 2*s.*; fair, 1*s.* 11*d.*; rather coarse and part dark, 1*s.* 9*d.* to 1*s.* 10*d.*, and common coarse, 1*s.* 7*d.* Lima-Jamaica, of which 18 bales were offered and sold, fetched 1*s.* 4*d.* to 1*s.* 5*d.* for ordinary part chumpy, while 23 bales of native Jamaica sold at the following rates : dull grey and yellow mixed, 1*s.*, and fair red, 1*s.* 1*d.* per lb. For some 3 bales of Honduras, 1*s.* 1*d.* per lb. was paid, the quality being of doubtful character. A week later, sarsaparilla was still in fair demand at the following rates : native red Jamaica, 2*s.* 2*d.*; lima, 1*s.* 7*d.*, and native red, 1*s.* 2*d.* to 1*s.* 3*d.* At the close of the month, the following were the prices realized for the several kinds : fair grey, from 1*s.* 9*d.* to 1*s.* 10*d.*; native Jamaica was sold at from 11*d.* to 1*s.* for dull to fair red, and 7*d.* for sea-damaged. At these rates, 11 bales were sold, and another 4 bales were disposed of at 11*d.* for good red, slightly sea-damaged, and 1*s.* for yellow and red mixed.

KOLA, LIME JUICE, ETC.

At the beginning of the month, a package of small to bold dried West Indian kolas fetched 1¾*d.* per lb., and at the close of the month, 36 packages were offered and several sales made at 2½*d.* for good, dried, West Indian, inferior qualities realizing from 1¼*d.* to 1¾*d.* per lb. On the 8th of the month, lime juice was in good demand, fair pale realizing from 1*s.* 3*d.* to 1*s.* 4*d.* per lb., and inferior qualities, from 1*s.* 2*d.* to 1*s.* 3*d.* per lb. Of distilled oil of limes, some purchases have been made at from 2*s.* 6*d.* to 2*s.* 7*d* per lb.

BRITISH GUIANA RICE CROP.

While planters at Barbados and other West Indian Islands are anxiously looking for rain, the rice farmers of British Guiana are equally desirous of a lengthy period of dry weather in order that their crops may be successfully ripened. In their fortnightly report on the rice crop of the colony, dated September 4, Messrs. Sandbach, Parker & Co., of Georgetown write :—

The weather during the past fortnight has continued suitable for the growing rice crop, but farmers are anxiously looking forward to a spell of dry weather during the next two or three months, since if rain occurs during the reaping season the crop will be seriously damaged.

A few lots of cleaned rice have come to town during the past fortnight, and this, combined with the fact that the new crop will soon be ripe, has tended to have a lowering effect upon prices, and sales have been made at from $5·40 to $5·50 per bag of 180 lb., ex store.

About 700 bags of rice were shipped to the West Indian Islands during the fortnight ending August 21 last, but none during the fortnight ending September 4.

MARKET REPORTS.

London,—August 18, 1908, The West India Committee Circular; Messrs. E. A. De Pass & Co., August 21, 1908; Messrs. Kearton, Piper & Co., September 1, 1908.

Arrowroot—Quiet; no quotations.
Balata—Sheet, 2/1 to 2/4; block, no quotations.
Bees'-wax—Good quality, £7 7s. 6d. per cwt.
Cacao—Trinidad, 59/- to 74/- per cwt.; Grenada, 51/- to 59/- per cwt.
Coffee—Santos, 25s. 9d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £16 to £16 10s. per ton.
Cotton—St. Vincent, 14d. to 15d.; Barbados, 14d. to 15d.; St. Kitt's, 14d. to 15d.; Montserrat, 14d. to 15d. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—Very slow of sale; 2/6 to 3/- per box.
  Pine-apples—St. Michael, 1/3 to 3/- each.
  Grape Fruit—7/- to 9/- per box.
  Oranges—Jamaica, 8/6 to 9/- per box.
Fustic—£3 10s. to £4 10s. per ton.
Ginger—Very slow of sale.
Honey—19s. 6d. to 25s. per cwt.
Isinglass—West India lump, 2/1 to 2/4 per lb.; cake, 10d. per lb.
Lime Juice—Raw, 1/2 to 1/4 per gallon; concentrated, £14 7s. 6d. per cask of 108 gallons; Distilled oil, 2/4 to 2/5 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10s. to £4 4s. per ton; roots, £2 10s. to £3 10s. per ton.
Mace—Quiet; no quotations.
Nutmegs—Quiet.
Pimento—Quiet.
Rum—Jamaica, 3/3 to 8/-; Demerara, 2/4 to 2/7 per gallon; Trinidad, no quotations.
Sugar—Crystals, 15/9 to 16/9 per cwt.; Muscovado, 15/10; Molasses, no quotations.

New York,—August 21, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 13c. to 18c.; Grenada, 12¾c. to 13c.; Trinidad, 13c. to 13⅜c.; Jamaica, 10½c. to 12½c. per lb.
Cocoa-nuts—Jamaica, select, $25·00 to $26·00; culls, no quotations; Trinidad, $25·00; culls, $15·00 per M.
Coffee—Jamaica, ordinary, 7½c.; good ordinary, 7¾c. to 8⅛c. per lb.
Ginger—10¾c. to 14c. per lb.
Goat Skins—Antigua and Barbados, dry flint, from 48c. to 49c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c. per lb., dry flint.
Grape Fruit—Jamaica, $5·00 to $7·00 per barrel.
Limes—$3·50 to $4·00 per barrel. Market over-stocked.
Mace—26c. to 32c. per lb.
Nutmegs—110's, 8½c. to 9c. per lb.
Oranges—Jamaica; $4·50 to $5·00 per barrel.
Pimento—3¾c. to 4c. per lb.
Sugar—Centrifugals, 96°, 3·90c.; Muscovados, 89°, 3·40c.; Molasses, 89°, 3·15c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., September 7, 1908; Messrs. T. S. Garraway & Co., September 14, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica, $14·00 per 100 lb.
Cocoa-nuts—$16·00 per M. for husked nuts.
Coffee—Jamaica, $9·00 per 100 lb.
Hay—$1·40 per 100 lb.
Manures—Nitrate of soda, $62·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·00 to $2·25 per 100 lb.
Potatos—Teneriffe, $2·70 per 160 lb.
Peas—Split, $7·00; Canada, $3·40 per bag.
Rice—Demerara, $6·10 (180 lb.); Patna, $3·50; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, September 5, 1908; Georgetown Chamber of Commerce Fortnightly Market Report, September 4, 1908.

Arrowroot—St. Vincent, $9·50 to $10·00 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—60c. to 96c.
Cassava Starch—$8·00 per barrel of 196 lb.
Cocoa-nuts—$14·00 to $15·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb.
Dhal—$5·50 to $5·60 per bag of 168 lb.
Eddoes—80c. to 88c. per barrel.
Molasses—Yellow, no quotations; Dark, no quotations.
Onions—Madeira, 2¾c. per lb.; Lisbon, no quotations; Dutch, 2½c. per lb.
Plantains—12c. to 28c. per bunch.
Potatos—English, No quotations.
Potatos—Sweet, Barbados, $1·92 per bag.
Rice—Ballam, $6·25; Creole, $5·50 to $5·60 for good; Seeta, $6·00.
Split Peas—$6·50 to $6·60 per bag (210 lb.); Lisbon, $4·25.
Tannias—$1·32 to $1·44 per bag.
Yams—White, $2·16; Buck, $1·92 per bag.
Sugar—Dark crystals, $2·00 to $2·40; Yellow, $3·00; White, $3·50 to $3·70; Molasses, $1·90 to $2·00 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·60 to $5·75 per M.
———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—September 5, 1908.—Messrs. Gordon, Grant & Co.

Cacao—$13·50 to $13·75 per fanega.
Cocoa-nuts—No quotations.
Cocoa-nut Oil—65c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. to 8½c. per lb.
Copra—$2·90 to $3·10 per 100 lb.
Dhal—$4·60 to $4·70 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·60 to $1·80 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $4·75 to $4·80 per bag.
Split Peas—$6·50 to $6·75 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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The Value of Records.

FEW enterprises make much progress until the things with which they deal are measured and recorded, so that accurate comparisons can be made. This is eminently true alike of the chemical and physical sciences and of many forms of industrial work, including agricultural operations.

When towards the close of the eighteenth century James Watt induced the owners of the Cornish mines to substitute his engines for the form then in use, he took as payment for these engines one-third of the saving effected in the coal consumed. This arrangement led to accurate measurements, not so much with the idea of saving fuel, but in order to ascertain the amounts to be paid. When, in 1800, this weighing of the coal ceased, the character of the work fell off and the coal consumption increased. Soon afterwards an accurate system of recording and reporting was again introduced, with such excellent results that it is said that the practice of keeping accurate records is thought to have been attended with more benefit to the district than any other single event, excepting only the invention of the steam-engine itself.

In connexion with planting industries in the West Indies, measurements, weighings, and records are in many cases very imperfect, so that progress is retarded thereby, and it is more than probable that the above experience might be repeated by agriculturists in these islands. The analogy is fairly close between weighing coal and weighing canes. In the case of the Cornish miners the weighing was undertaken for a specific purpose, but was ultimately found to have important collateral results. Doubtless the question frequently arose: 'What is the good of weighing the coal? It does not make it give more heat?' But the results were tangible and important, and so with the weighing of canes it would soon be found that the results more than repaid the cost.

It is not difficult to predict some of the directions in which the weighing of canes would yield remunerative results. Observations have shown that the work done by cane mills is extremely irregular, and that very great losses may remain undetected unless close records are kept. This is so fully recognized in large modern factories that very great attention is paid to the work done by the mill, both by the chemists and engineers, and constant results are recorded. Even with a small mill, if the canes were weighed, wasteful fluctuations would soon be discovered and stopped.

Further, in the absence of weighing, it is extremely difficult to know what results are obtained from any particular kind of cane, or from the use of any particular manure, or from the performance of any particular cultural operation. A knowledge of the weight of canes obtained would throw a flood of light on all these questions.

The judgement of the planter, unaided by a knowledge of the weight of cane, is frequently at fault in appreciating the value of a new variety of cane. He may over-estimate, or under-estimate its merits, and so money will be wasted. With a knowledge of the weight obtained he would act with precision, so that rapid and steady progress would set in. How many planters can say with precision to what extent ratoon canes are remunerative in comparison with plant canes? A knowledge of weights would give precision to their ideas, and lead to the saving of money.

Similarly, much money is probably wasted in the matter of manures from want of knowledge, either too much manure or too little being employed. A knowledge of weights would, after a few years' experience, lead to a much more economical use of manures of all kinds.

The value of measuring and recording is not confined only to the weighing of canes. It holds good of most facts relating to estate work. Records of the cost of various operations, if carefully made and properly arranged, will tend to economy. Records of the food consumed by stock, of work done, and of the cost, etc., worked out under various heads, will soon indicate when economies may be practised, and increased returns obtained. Economies mean not merely diminished expenditure but expenditure to better advantage, and this in time may mean increased expenditure based upon accurate knowledge.

A distinction must be made between records and mere memoranda. The latter are notes taken for temporary use, the former are notes carefully preserved and arranged for future reference. The mere making of the record is not all-sufficient; it is necessary that the results obtained should be compared and correlated so that the conclusions to be drawn from them may be set out. There doubtless exists much material in the form of memoranda and records from which valuable deductions might be drawn if someone would take the trouble to arrange the information in a form for comparison. As a good example of what may be done in this direction may be instanced Mr. J. R. Bovell's paper on the 'Cost of growing Sugar-canes in Barbados' (*West Indian Bulletin*, Vol. I, p. 64). It would prove of considerable advantage if much more work of this kind were done.

If records such as those referred to could be obtained for a wide range of plantation work in various parts of the West Indies, and the results compared from time to time, it would be found that many changes by way of improvement would speedily spread from district to district, and the improved ideas of one place would quickly exert a beneficial influence at a distance, instead of, as now, influencing only a small area, and even there producing but limited results for want of further stimulation.

One effect of the keeping and comparing of records must not be overlooked. This work reacts upon the planter, making him more alert and more observant, and he becomes keener to detect losses and to forward improvements, so that the general advancement of agriculture is ensured thereby.

FATS AND OILS OF NUTMEGS.

In view of the constant and increasing demand for oil seeds that exists on the European market, an examination has lately been made of the oil-yielding capacity of the various nutmegs of India, with a view to their profitable utilization.

The true nutmeg (*Myristica fragrans*), which is the kind grown in the West Indies, but is really a native of the Moluccas, yields about 20 to 30 per cent. of oil, known on the market as 'oil of mace' or 'nutmeg butter.' This product is used in Europe in the manufacture of scented oils, perfumes, and soaps, and as a flavouring agent in cooking and perfumery.

An Indian nutmeg specially referred to in the report on the above-mentioned investigations is *Myristica canarica*. The seeds of this species showed on analysis a content of 49·40 per cent. of fat, which is utilized by the natives in districts where the tree is found for the purpose of making candles. Another native species (*M. malabarica*), also yields a considerable percentage of fat. The presence of resins however depreciates its value. The fat is used as an ointment and for illuminating purposes.

Many other species of nutmegs are also discussed, which are known to contain a useful proportion of fat or oil. Among these may be mentioned *Myristica Bicuhyba*, a native of Brazil, and the seeds of which yield 59·6 per cent. of fat, which has a peculiar odour. A variety abundant in certain parts of the West Indies is *Myristica surinamensis*, and the seeds of this nutmeg contain 60·53 per cent. of fat, readily extracted and solid at ordinary temperatures. It is believed that the fats of all the above varieties would be valuable in the manufacture of soap and candles, but it is doubtful if it could be prepared and put on the market at a profit.

BARBADOS PEASANTS' AGRICULTURAL SHOW.

The ninth annual Peasants' Show of Agricultural Produce and Live Stock to be held at Barbados, will take place at Mount plantation, St. George, on December 9 next, by kind permission of the Attorney, the Hon. G. Laurie Pile, M.L.C. Referring to the value of these annual exhibitions, the *Barbados Bulletin* of September 25 writes:—

On the occasion of the last peasants' show, held at Applewhaites in December 1907, the Imperial Commissioner of Agriculture bore testimony to the distinct advances that have been made in the class of articles sent in since the shows were started, and he expressed the hope that the local Government would see its way to come to the assistance of the Department of Agriculture by providing the funds for the prizes, which would no longer be available from Imperial sources in consequence of the reduction of the grant. We are pleased to find that the Government has recognized the good work which has been done in this direction, and has shown its practical appreciation thereof by acting upon Sir Daniel Morris' suggestion, thus ensuring the continuance of these local exhibitions, which have now come to be looked forward to as regular annual fixtures among the class for which they are principally intended.

The prize list is of the usual kind, including prizes for the best exhibits of plants grown in school gardens and in pots or boxes, etc., by pupils attending elementary schools. Diplomas of merit are offered by the Imperial Department of Agriculture for competition among large cultivators as follows: For the best stool of sugar-canes, best collection of yams, best collection of sweet potatos, best collection of eddos, best collection of Indian corn, best collection of Guinea corn, best sample Sea Island seed-cotton of not less than 25 lb., best crate of dwarf bananas packed for shipment, best crate of onions packed for shipment, and best bunch of plantains.

CULTIVATION OF ENGLISH POTATOS AT MONTSERRAT.

Some experiments in the growth of English potatos were carried out at Montserrat in 1907, under the direction of the Curator of the Botanic Station. The following particulars as to the results obtained are given in the *Annual Report* (1907-8) on the work of the Botanic Station:—

A small plot of English potatos was planted on October 18 on St. George's Hill, Montserrat. It was intended to plant a larger area, but a number of the sets were lost through decay before planting. The potatos were grown at an elevation of about 600 feet. The land was carefully prepared by pickaxing and was manured. The area planted was $\frac{1}{16}$ acre. The rows were 2 feet apart, and the sets 9 inches apart in the row. Thirty pounds of sets were used. The potatos were dug up on December 3, and the crop yielded weighed 138 lb. 'Bliss Triumph' was the variety planted.

The plot was replanted with the sets reaped in December, after the potatos had commenced to sprout. In this case the rows were placed as before, 2 feet apart, but the sets instead of 9 inches apart were planted at distances of 4 inches from each other. The amount of potatos reaped was 145 lb.

A plot was also grown at Grove Station, and planted in February, with some of the potatos reaped from St. George's Hill in December. The area was $\frac{1}{20}$ acre and the yield of potatos was 180 lb.

In each of these three cases the amount of potatos yielded might be considered satisfactory. The potatos individually were small, and the quality was inferior, being somewhat 'watery' in character.

Alongside the last mentioned plot at Grove Station, three rows of an acclimatized potato were planted. This variety, so far as the writer can ascertain, has been growing in Montserrat for more than twenty years, and its cultivation is carried on in a small way in the Molyneux district. It is a clean-skinned, white potato, roundish-oval in shape, with shallow eyes. The tubers are very small and seldom reach the size of a hen's egg. They grow quite as vigorously as the imported sets and occasionally bear flowers. In this case a row 207 feet in length was planted and yielded 70 lb. of tubers.

STOCK FEEDING AT THE GOVERNMENT FARM, TRINIDAD.

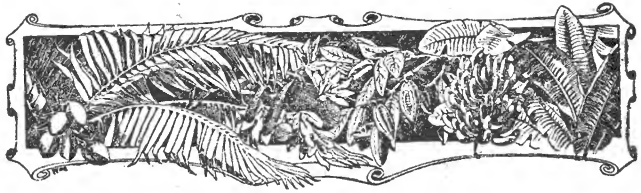
In his latest *Annual Report* (1907-8) the manager of the Trinidad Government Stock Farm calls attention to the value of cocoa-nut meal, cotton-seed meal, and rice meal as food-stuffs for cattle. The following is quoted from Mr. Meaden's report:—

Cocoa-nut meal is our own production in Trinidad, and when fresh this material has exceptional value for feeding purposes to all kinds of animals. The rough, undecorticated cotton-seed meal can be obtained from the cotton-growing islands of the West Indies. It is useful for milking cows, working oxen, and estate cattle generally, and for these latter it should take the place of imported oilmeal, since it has a better and cheaper food value, while the manure produced by animals fed on cotton-seed meal is also of superior value.

Rice meal, imported from British Guiana, is the refuse from the rice grown in that colony, and is obtained on milling the grain. This meal has good feeding properties, is clean, sweet, and useful for all classes of animals. Good rice meal, in a fresh state, possesses similar food value to bran or corn meal.

A useful bulky food fed at the Government Stock Farm to growing oxen at grass, and one which improves their weight and condition, consists of a mixture of banana leaves and stalk, with Guinea grass and Para grass, the whole chopped up by means of a chaff cutter, and with $\frac{1}{2}$ lb. molasses, and $\frac{1}{2}$ lb. cotton-seed meal added for each head of oxen. This is an economical mixture, and one which was readily consumed by the oxen, the results which followed being very satisfactory.

The use of green bananas as food for stock has been increased as much as possible at the Government Farm. During the year 60,000 lb. of bananas were grown and turned into food for the various animals—cooked for pigs, chopped fine and added to the rations for the calves, and also sometimes included in those of the oxen and growing steers. All animals are extremely fond of the green fruit, which forms an economical and nutritious addition to their diet. Sliced and dried, the bananas make a good food for poultry and sick animals.



WEST INDIAN FRUIT.

ORANGE AND BANANA CULTIVATION IN EASTERN MEXICO.

Orange cultivation has of late undergone extensive developments in the districts around Tampico, Eastern Mexico. The port of Tampico is in about the same latitude as northern Cuba, so that growers are within easy shipping distance of the United States' market.

According to the latest report (1907) of the British Consul at Tampico, the land in the neighbourhood which is most suited for citrus fruit cultivation requires no irrigation, and the conditions are even more favourable for orange growing than in Florida or California.

Six years ago land could be purchased at 16*s.* per acre, but prices have of late advanced to £10 an acre, as the value of the district for fruit production has become recognized. Nearly all the land in the neighbourhood is being bought up in small areas by immigrant settlers.

Budded orange trees can be purchased from the older settlers, and starting in this way it is stated that the newcomer may expect his first crop at the end of four years from planting. This first crop may be estimated at from 200 to 300 boxes of fruit per acre, worth 2*s.* to 3*s.* per box, and the return increases annually, until it reaches 750 boxes per acre.

The varieties of orange that appear to be best adapted to the prevailing conditions are stated to be the 'Tangerine,' 'Hart's Late,' and 'Boone's Early.' These are standard varieties, well known on the United States' market. In propagating these kinds, they are budded on to the native wild orange of the district. Lemons and grape fruits are also cultivated with success around Tampico, and there is no difficulty in finding a market for the produce.

A return which is said to approximate to £20 or £30 per acre can be obtained during the period of waiting, before any yield is given by the orange trees, by raising a crop of tomatos between the young orange plants. It is advised, however, that not more than one planting of tomatos should be made.

The labour employed upon these small fruit estates is chiefly Mexican, and the rate of wages is about 1*s.* 9*d.* per day. It is mentioned that negro labourers from Jamaica and the Bahamas can also be secured without much difficulty, but these men command higher wages ranging from 2*s.* to 2*s.* 6*d.* per day.

Banana growing has proved another profitable industry in the same district of Mexico, and the Consul reports that during the past year several large companies have been formed for the cultivation of this fruit. Large tracts of suitable land can be purchased uncleared at about £1 per acre. Since the 'Gros Michel' or Jamaica and Costa Rica variety of banana (*Musa sapientum*) is the best known kind in the United States, the chief attention is being paid to this variety, and many growers are importing plants from Jamaica in preference to cultivating native Mexican kinds. It is believed that by this means a market for the produce will be assured in the United States.

During the year 1907, several hundred colonists from the American States have settled in the neighbourhood around Tampico, and purchased small tracts of land for fruit growing and other purposes.

CRYSTALLIZED FRUITS.

The following notes on the preservation of fruit are taken from the *Agricultural Journal* of the Cape of Good Hope, July, 1908:—

The means of preserving fresh fruits in a crystallized form is attained by extracting the juices from the fruits and replacing them with sugar syrup, which upon hardening, preserves the fruit from decay, and at the same time retains their natural shape and, to some extent, flavour. The process is as follows: Fresh fruit, nearly ripe, whole, or cut into quarters, in the case of citrus and such large sorts, should be boiled until they are soft enough to be handled without breaking. In the case of citrus fruits, the rind should be lightly pared off and the pulp removed, at least a couple of hours before boiling. The softer kinds, such as peach, plum, apricot, etc., would merely be steeped in boiling water for a very short time, care being taken that they are not immersed sufficiently long to be cooked. The exact time can only be determined by actual experience. After this the water from the fruit should be allowed to drain off thoroughly, and when sufficiently dry, they should be placed in hot sugar syrup, and kept there for a few days, so that the sugar may enter the fruit cells and displace what juice remains after the boiling or scalding process. The fruit should then be lightly washed in clean cold water and packed in dry white sugar while wet, and allowed to remain there and dry off in a draught, until it is hard enough to be packed away for transport. A common home recipe for preparing sugar syrup is: One pound white sugar to 1 pint of water, adding the white of an egg to every 4 lb. of sugar; boil this mixture over a fast fire for twenty minutes, and strain through a cloth while hot, when it is ready for use.

RICE CROP PROSPECTS IN BRITISH GUIANA.

Messrs. Sandbach, Parker & Co., writing on September 18 last, report as follows on the present condition and prospects of the rice crop of the colony :—

> The weather during the fortnight has been rather too wet, several heavy showers having fallen. Reaping has started in a few scattered districts, and will be general throughout the colony in the next two weeks. The frequent showers are affecting harvesting and milling operations, and a spell of dry weather is anxiously looked for.
>
> Very little cleaned rice has come to town during the fortnight, and the market is bare. The few small lots offered met with ready sale at $5·40 to $5·50 per bag of 180 lb.
>
> There have been no shipments to the West India Islands during the fortnight.
>
> Present prices for rice of good export quality are—23*s.* to 23*s.* 6*d.* per bag of 180 lb., and 21*s.* 6*d.* to 22*s.* per bag of 164 lb., f.o.b. Demerara.

FORAGE CROPS IN THE PHILIPPINE ISLANDS.

Large numbers of live stock such as horses, mules and cattle are kept in the Philippine Islands, and these necessitate the importation of considerable quantities of forage every year for their support. It has been thought possible that the needs of these animals, may be largely, if not entirely, supplied by home-grown fodder, and numerous experiments in the cultivation of both local and imported forage crops have lately been carried out in the islands.

No hay is made in the Philippines, although in the course of an article in a recent number of the *Philippine Agricultural Review*, it is suggested that hay farms in the neighbourhood of Manila would be both successful and profitable, and the animals are therefore largely fed on green forage crops together with imported hay and grain.

Among the crops, the forage value of which has been investigated by the Bureau of Agriculture of the Territory, are native and imported varieties of maize, rice, Kaffir corn and other sorghums, as well as Teosinte (*Reana luxurians*), Bermuda grass (*Cynodon dactylon*), Guinea grass (*Panicum maximum*), a native variety of grass known as 'Zacate' (*Homalocenchrus hexandrus*), *Paspalum dilatatum*, Velvet beans, and cowpeas.

The native Philippine varieties of maize do not appear to have given good results as fodder crops ; they do not withstand heavy rain, and the amount of vegetation produced in dry weather is insignificant. Better results are obtained when these varieties are grown for the grain than when raised for green fodder purposes. American varieties of maize, both Dent and Flint kinds, have been introduced, and the white Dent variety has so far given the best results.

Rice is grown extensively all over the Philippine Islands, a large number of varieties being cultivated. The grain is used on a large scale for stock feeding, and it also produces a heavy yield of green forage, which is, however, of poor quality. Broken rice and rice meal produced in milling are also sold as suitable stock feeds. The Bureau of Agriculture has made trials with several imported varieties of rice, and the 'Carolina Golden,' together with a number of varieties of mountain rice, have produced excellent yields of grain. Promising results have also been obtained in certain experiments in which rice was grown, cut in the green state, and cured as a fodder for use in mixing with other food stuffs.

Kaffir corn and other varieties of sorghum are also commended to the notice of agriculturists in the Philippine Islands by the officers who are carrying out these forage experiments. Kaffir corn has shown itself to be very resistant to drought. It produces a good supply of green forage, and abundance of seed. All animals eat it readily when green, but it is difficult to dry, and is not a palatable stock food when cured. Some very satisfactory results were obtained from planting a mixture of Kaffir corn and Velvet beans. The corn serves as a support for the beans and the two are cut together for use as green fodder. The Early Amber and Orange varieties of sorghum proved satisfactory and are stated to almost as good as Kaffir corn. They are not so resistant to drought, however, and produce a smaller yield of seed.

Teosinte (*Reana luxurians*), a crop which is grown on a small scale in Dominica and other West Indian Islands, is a plant which has received a good deal of attention in the Philippines. It is reported, however, that it has not been as satisfactory as was at first anticipated. It does not stand drought as well as the sorghum, and produces but a rather small amount of seed, which deteriorates during the rainy season. Teosinte, however, makes excellent forage, although not of such desirable quality as Kaffir corn. It is succulent in nature, cures well, but the amount of dry matter produced is not large.

Bermuda grass (*Cynodon dactylon*) is a native of the Philippine Islands, and is the standard forage grass throughout the provinces of the Territory, and is also believed to be admirably suited for the production of hay. It grows quite well from sea level to a high latitude, and will stand great extremes of wet or dry weather.

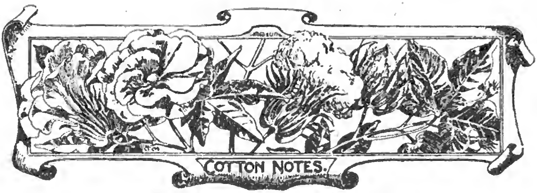
Guinea grass is also under experiment at several Agricultural Stations in the Philippines, and a recent report states that for the production of green forage, the crop is the most promising among the introduced plants. The indications are that the grass will give from 5 to 15 tons per acre per crop, and that it may be cut at least once every three months, assuming the rainfall to be satisfactory. The South American grass (*Paspalum dilatatum*) has been recently introduced, but has not been so successful as Guinea grass.

The Florida Velvet bean has lately been grown in the Islands, and the vines utilized for forage purposes. This imported bean has not, however, proved so satisfactory as a native species (*Mucuna lyonii*) which grows much more vigorously and produces a heavier weight of forage.

Cowpeas imported from the United States, have also been experimentally grown, but with rather poor success, on account of the fact that they are badly attacked by insects during the dry season.

DEPARTMENT NEWS.

The Secretary of State for the Colonies has been pleased to appoint Mr. F. A. Stockdale, B.A., F.L.S., late Holmes Exhibitioner at Magdalene College, Cambridge, and for the past three years Mycologist and Lecturer in Agriculture on the staff of the Imperial Department of Agriculture, to the newly created post of Assistant Director to the Department of Science and Agriculture and Government Botanist, in the colony of British Guiana.


COTTON NOTES.

LANCASHIRE COTTON CONFERENCE.

An account of the proceedings of the Conference held in Lancashire in August last between the West Indian cotton growers and Manchester spinners has been printed in booklet form by the British Cotton-growing Association, and copies of this booklet are now on sale (price 1s.).

The efforts made to develop a cotton-growing industry in various parts of the Empire have of late attracted a good deal of attention in Great Britain, and the interest and sympathy taken by the mother country in this form of colonial enterprise are evident from the lengthy reviews of the proceedings of the late Conference which were published in the London and provincial press. In this connexion the editorial articles dealing with West Indian cotton growing which appeared in the London *Times* and the *Morning Post* may be specially mentioned.

The Cotton Conference was opened on August 5 at the offices of the British Cotton-growing Association, Commercial Buildings, Manchester, under the presidency of Sir Alfred Jones, K.C.M.G. In addition to a large and representative gathering of cotton spinners there were also present Colonel Seely, M.P., Under-Secretary of State for the Colonies, Mr. Alfred Emmott, M.P., Deputy Speaker of the House of Commons, and Sir Gerald Strickland, K.C.M.G., late Governor of the Leeward Islands and now Governor of Tasmania. Addresses of welcome were given by Sir Alfred Jones, Colonel Seely (on behalf of the Colonial Office), and Mr. Emmott (on behalf of the House of Commons).

Sir Daniel Morris, K.C.M.G., Imperial Commissioner of Agriculture for the West Indies, responded to these addresses of welcome on behalf of the West Indian delegates. The Commissioner then went on to give a history of the inception and progress of Sea Island cotton growing in the West Indies. He was convinced that a good deal might yet be done to benefit the industry by seed selection experiments carried on by planters in co-operation with the Imperial Department of Agriculture for the purpose of producing disease-resistant varieties of cotton, as well as varieties giving a higher yield of lint.

Mr. J. Arthur Hutton, Chairman of the British Cotton-growing Association, next spoke. He stated that the Association was very willing to handle colonial-grown cotton, and to make only the lowest possible charge for commission on its sale, to obtain the best market prices, and to make advances on the value of the produce before it was sold, without any extra commission. Mr. Hutton did not attribute the present low prices for cotton to over-production, but rather to the late financial crisis in America, which had depressed trade all over the world. While planters should be warned against raising their hopes of prices too high in the future, he was confident there would be such an improvement as to allow the industry to be carried on at a profit.

Mr. Lomas Oliver, Member of Council of the British Cotton-growing Association, pointed out that while there was but a limited demand for the very fine class of cotton which was only used in the manufacture of expensive and luxurious articles, the demand for cotton of a slightly lower grade was quite unlimited. No pledges could be given as to the future prices of cotton, which like that of all other commodities, was regulated by supply and demand, but there was no reason for West Indian planters to be despondent over the present temporary depression. The cotton consigned to him from the West Indies was excellent in quality and had come forward in good condition.

Mr. Wolstenholme (of the firm of Messrs. Wolstenholme & Holland) dealing with the condition of the Sea Island cotton market said that there were 1,400 bales then on hand. This, however, he did not think extraordinary. The firm of which the speaker was a member had dealt with the greater amount of cotton produced in the West Indies. He believed that better prices would in many cases be obtained by growers if greater care was exercised in grading, packing, and marking the cotton sent forward. Bales from the West Indies often contained cotton of mixed lengths of staple: this undoubtedly had a depressing effect on prices. The condition of cotton imported from the United States compared very favourably with that from the West Indies, as in the former country every possible care was taken in grading and marking the produce. This gave American cotton an advantage on the market over the colonial-grown product.

The progress of the cotton industry and estimates of the cost of growing the crop in the different islands were dealt with in speeches by Dr. C. E. Gooding (Barbados), Mr. A. M. Lee (Antigua), Hon C. J. Simmons (St. Vincent), and Mr. J. R. Bovell (Barbados). It was shown that at prices which had prevailed during a part of the 1907-8 season, cotton growing could not be carried on at a profit in these islands, and in support of this statement Mr. J. R. Bovell quoted a set of carefully prepared figures relating to the work of five different estates at Barbados. It was mentioned that some planters had already lost money on their cotton crops of the past season.

Mr. J. T. Allen spoke as to the condition of the industry in the island which he represented. Cotton growing had done a great deal of good in Montserrat, and had taken a firm hold. The cultivation, however, was an expensive one, and the speaker gave it as his opinion that less than

1s. 4*d.* per ℔. would leave no margin for profit. This statement was supported by Mr. Conrad Watson, who had had experience in cotton growing both in Montserrat and Jamaica.

Mr. J. J. Camacho gave an account of the losses occasioned in the cotton crop of Antigua last season by the insect pest responsible for the boll dropping. This was a disheartening experience to cotton growers in the island. The speaker was glad to be able to say that the results of the Conference were very encouraging.

On the evening of August 6, the West Indian delegates and other members of the Conference were entertained at a banquet at the Town Hall by the Lord Mayor of Manchester.

On the following day an excursion was made to Oldham, and visits paid to the factories of Messrs. Platt Bros. Ltd., Messrs. Asa Lee & Co., and also to one of the principal spinning mills. Luncheon was provided by the Oldham Chamber of Commerce, after which the delegates returned to Manchester, and in the evening were the guests of the Fine Spinners and Doublers Association, Ltd., at a banquet given at the Queen's Hotel.

Short informal meetings of the delegates and spinners were held on Saturday, August 8, and on the following Monday a visit was paid to Liverpool, where the Conference was resumed at the Adelphi Hotel. After an address of welcome had been given, and various speeches made, the resolution urging His Majesty's Government to place the Imperial Department of Agriculture on a permanent basis (the full text of which was given in the last issue of the *Agricultural News*) was proposed by Mr. J. A. Hutton, seconded by Mr. George Carrington, and carried unanimously.

At the close of the meeting the following resolution was proposed by Mr. H. E. Thorne (Barbados), seconded by Mr. A. Smith (St. Vincent), and also carried unanimously: The delegates from the West Indies desire to express their deep appreciation of the valuable services rendered by the British Cotton-growing Association, and hope that so far as possible the cotton planters whom they represent will continue to co-operate with the Association in every way practicable, with a view to maintaining and extending the industry which has already added materially to the prosperity of His Majesty's West Indian possessions.

The visitors were entertained at luncheon by the Liverpool Chamber of Commerce, and a banquet at the Town Hall, given in the evening by the Lord Mayor of Liverpool, brought the Conference to a close.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland of Liverpool, write as follows, under date of September 14, with reference to the sales of West Indian Sea Island cotton:—

There has been a limited enquiry for West Indian Sea Island descriptions since our last report, the business being confined to qualities at 14*d.* to 14½*d.*

The sales include Barbados, St. Croix, Anguilla, and Montserrat.

Owing to the continued dullness in the fine spinning trade, spinners show little inclination to buy at present. There appears to be a slight improvement in American and Egyptian yarns, but we regret that so far, the finer counts do not appear to have been affected.

Quotations for the new crop American Sea Islands show an easier tendency.

SEA ISLAND COTTON IN THE UNITED STATES, 1907-8.

In their *Cotton Circular* dated September 2 last, Messrs. Henry W. Frost & Co. give a statement of the output of Sea Island cotton from Georgia, Florida, and Carolina (including the Sea Islands), for the year 1907-8, together with a review of the market conditions prevailing during the season.

The cotton crop of Carolina reached 12,727 bales, as compared with 8,037 bales produced in 1906-7. Georgia produced 48,480 bales, against 28,034 turned out in 1906-7, while the Florida crop alone shows a decrease, being 22,597 bales in 1907-8, as compared with 23,719 in 1906-7. It will be seen therefore that the Sea Island cotton crop of the United States increased from 58,668 bales in 1906-7 to 84,926 bales in 1907-8, this being approximately an advance of 44 per cent.

Of the year's production, 52,695 bales were consumed in the United States, 19,682 bales exported to Great Britain, and 10,035 bales shipped to other European countries, chiefly France.

The 1907-8 market for cotton from the Sea Islands and Carolina was opened towards the close of October with sales of 100 bales of 'extra fine quality,' at 38c. per ℔., and two 'extra extra' planters' crop lots at 55c. and 65c. per ℔. During November the demand was active, with sales of upwards of 3,000 bales, cotton of 'fully fine' quality realizing 34½c. to 35c., and 'extra fine' quality, 37c. to 38c. The activity of the market continued throughout December, and prices advanced 1c. to 2c. per ℔. Most of the cotton was purchased for England. The unusual demand for the time was attributed to the poor quality of the Georgia and Florida crops, which failed to furnish any high-grade cotton.

After the demand mentioned had been supplied, the market became quiet, and remained dull from January to the end of the season. The trade in fine cotton goods has been bad; there has been but a moderate demand for planters' crop lots, and with the exception of those of the finest quality, which were taken by France, the larger part still remains unsold.

The state of the market at the close of the season (end of August) was dull, and no demand existed for the 2,317 bales still remaining in stock. These are held for prices of from 32c. to 45c. per ℔.

Messrs. Frost's *Circular* closes with reports on the present condition of the growing crop in the three States, and estimates of the return for the coming year.

The latest advices state that there has been no change in the cotton area planted for 1908-9 in Florida and South Carolina, but in Georgia there has been a decrease of 15 to 20 per cent.

The weather conditions in Carolina have been favourable from the time of planting until August, when continued high winds, and intense heat, followed by heavy rains, have caused shedding of bolls, and as mentioned in the last issue of the *Agricultural News*, the plants have put on a second growth, which will imperil the top bolls. This, it is believed, will reduce the return.

Reports from Georgia are conflicting. In the southern portion of the State, rains have been lately experienced, and the crop is promising. In the districts around Savannah the outlook is not so good.

In Florida, the cotton made a late start, and intense heat prevailed during the period of early growth, followed by heavy rains. This has caused a considerable amount of boll-shedding.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The value of keeping accurate records in connexion with the various operations of estate work is discussed in the editorial article of this issue, which has been contributed by Dr. Francis Watts, C.M.G. It is shown that if the practice of keeping careful records became more general many economies in estate management would almost certainly result.

Satisfactory returns were obtained as the result of growing English potatos on an experimental scale in Montserrat last year (page 307).

The cultivation of oranges and bananas is rapidly developing, and giving good returns in the Tampico district of Mexico (page 308).

Various fodder crops have been experimentally cultivated in the Philippines by the Bureau of Agriculture. A summary of a report on the relative value of these crops appears on page 309.

A condensed account of the proceedings of the late Lancashire Cotton Conference will be found on pp. 310-11, followed by a review of the market conditions in regard to Sea Island cotton which prevailed in the United States during the past season.

Under Insect Notes (page 314) is given the first portion of an article dealing with the characteristics and life-history of the Diptera or two-winged flies, with special reference to the species found in the West Indies.

Attention is drawn to two interesting articles on page 318 entitled respectively, 'The Fish of the Caribbean Seas,' and 'The Feeding Value of Nuts.'

Cost of Sugar Production in Cuba.

Some details as to the cost of sugar production in Cuba are included in the latest report of the Secretary of Agriculture for the island. On the average of five years—which includes the plant cane crop and four ratoon crops following—the average cost of preparation of the land, planting and cultivating each year is about $15·00 per acre. Over the same period the average yield of cane is 23 tons per acre per annum. The annual expense of reaping and transportation of the cane to the factories amounts to about $22·00, so that the total cost of planting, cultivating, and reaping works out at $37·00 per acre, or very approximately $1·70 per ton of cane. The average return from 1 ton of cane is stated to be 200 lb. of sugar of 96° test.

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Coffee in Ceylon.

A note in the latest report (1907) of the Curator of the Royal Botanic Gardens, Peradeniya, Ceylon, mentions that the 'Sierra Leone Upland Coffee' (*Coffea stenophylla*) flourishes at the Gardens, the trees growing to a height of 22 feet and yielding a heavy crop of berries, which however are small in size. The variety is but little attacked by the 'coffee leaf disease' (*Hemileia vastatrix*). 'Stenophylla' coffee was introduced into the West Indies from Kew about twelve years ago, and has done well at Trinidad and in British Guiana. Trees of the variety are to be seen at all the Botanic Stations in these islands, and doubtless supplies of seed could be obtained at most of them.

Of all the kinds of coffee grown at Peradeniya, the Curator awards the first place to a hybrid produced by a cross of the Liberian with the Arabian variety. This is remarkable on account of its productiveness and healthy vigour. The Congo coffee (*Coffea robusta*) is not so satisfactory, and the results obtained do not justify an extension of its cultivation.

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Agricultural Bank in the Philippines.

An Agricultural Bank has recently been established in the Philippine Islands under Government auspices, with the object of assisting not only small holders, but also agriculturists on a larger scale. The Committee appointed to deal with the question has recommended that a sum of £100,000 be set aside for the foundation of the bank, which is to be placed under the management of a Board of Directors, composed chiefly of representatives from various Government Departments.

Money can be borrowed from the bank for agricultural purposes only, as for the purchase of machinery, working animals, manures and seeds, etc., or for expenditure on irrigation, labour, etc. No loan is to be less than £5 in amount or more than £2,500, except in the case of corporate bodies designing improvements on a large scale, and agriculturists will not be allowed to borrow any sum which exceeds 40 per cent. of the value of their holding. Ten years is the maximum period for which a sum can be borrowed, and the interest is not to exceed 10 per cent. per annum.

Cotton and Cocoa-nuts in the Society Islands.

The French colony of the Society Islands possesses, in common with many of the West Indian colonies, a soil and climate admirably suited for the growth of Sea Island cotton. This fact, according to a recent British *Consular Report*, has been continually impressed upon the natives by the Government of the former islands, and Sea Island cotton seed, specially imported for the purpose, has been on several occasions distributed, but owing to the indolence of the owners of land, no more than 50 acres have been planted with the crop. The cultivation of Egyptian cotton, which demands less attention than the Sea Island variety, is preferred by the natives, and the former kind is more largely grown. In 1907 the total value of the cotton exported was £2,075, as compared with £1,052 in the previous year.

Cocoa-nut planting is by far the chief agricultural industry in the Society Islands, the exports of copra for 1907 being valued at £59,106, as against £81,759 in the previous year. Cocoa-nuts, valued at £3,315, were also shipped in 1907, compared with a value of £3,747 in 1906. The reduced value of the copra exports is partly due to the destructive effects of a hurricane which lately swept over the islands, and partly to a fall in prices.

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School Gardens in British Guiana.

School garden work is making satisfactory progress in British Guiana, according to the latest *Annual Report* (1907-8) of the Inspector of Schools. Model Gardens, to which periodical visits are paid by the children from schools in the neighbourhood, have been established by the Department of Science and Agriculture at several centres, i.e., at Belfield and La Grange, Demerara: at Stanleytown in Berbice: at Bourda: and one in Georgetown. It is stated that a Model Garden is also shortly to be started in Essequebo.

In addition to the Model Gardens there are seventy-eight gardens attached to Primary Schools in the colony, and efforts are made to keep the gardens in such a condition that they may be not only of educative value to the pupils, but also serve as object-lessons to the parents in the several villages.

At the Essequebo County Show, held in March last, the Model Gardens took twenty-eight prizes, and the School Gardens eighteen prizes. The money value of these awards was distributed among the pupils, and this will doubtless serve to stimulate their efforts.

The old complaint is apparently still heard sometimes, that while the teachers recognize the value of the training imparted by a course of school gardening, and while the children are readily induced to take an intelligent interest in the work, yet the grants offered under the Code regulations are insufficient for the subject to receive as much attention as would otherwise be the case. In British Guiana the teachers have to fence in the plot, get the first heavy work done, and supply the class with tools, etc., in order to qualify for a maximum grant of $1·00 per head on the number taking the work, which is seldom more than 20 per cent. of the children attending the school.

Maize-shelling Machine.

The introduction of labour-saving machinery does not usually appeal so much to the West Indian planter, who in most cases can obtain a good supply of cheap, if not efficient, labour without difficulty, as to agriculturists in other countries, more especially in the United States.

It may be of interest, however, to growers of maize on a large scale, to note that a machine for the purpose of shelling, dressing, and bagging maize is now being built by Messrs. Robey & Co., Ltd., of Lincoln, England, which promises to reduce manual labour to a minimum. The machine is built in three sizes, and it is claimed that when driven by an engine of 8 horse-power, the largest size is capable, if required, of shelling and preparing maize for the market at the rate of 12 tons per hour.

The construction and uses of the machine are dealt with in a recent number of the *Implement and Machinery Review*, and it is stated that the large grains, the small grains and offal, the large cobs, and the chaff and broken cobs, are all put automatically into separate bags, directly from the machine, the dust being blown away. There is a special arrangement for separating bad ears of corn before they reach the shelling cylinder, and in this way the spoiling of a good sample by bad grains is prevented.

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Rice Planting in British Guiana.

Some discussion has of late been aroused in British Guiana as to the most suitable time for planting the rice crop, and further, whether or not planters would be well advised to concentrate their attention on the production of one crop only per annum, instead of—as is now the case in the majority of instances—endeavouring to raise two crops each year.

Long experience in rice-growing countries has made clear the fact that the most successful crops are those which are sown in the wet season and reaped in the dry. So far as British Guiana is concerned, this would mean planting in May and reaping in September or October. These times are observed in many cases, but as a general rule, when two crops are grown the first planting is made in January, and the crop taken off in May or June. The second crop is sown as soon after as possible, and reaped in November or December. On one side it is argued that a single crop, sown and reaped at the proper time, would give a better return, both in quantity and quality, than the average return at present obtained by growing two crops. This is denied by many planters, who urge that the growth of a second crop materially increases the profits obtained on the year's working, since the cleaning and cultivation which the land receives for the first planting serves also for the second crop, which is planted without any expense for cultivation, beyond that entailed for a single ploughing. The cost of raising the second crop is therefore very small.

A committee has been appointed by the Board of Agriculture of the colony to consider and report upon the question.

INSECT NOTES.

Diptera.

The insects of this order are the two-winged flies or true flies. The word 'fly' is used in referring to many other insects, especially in combination with some other word which designates the insect according to its habits, its food, etc. Examples of this are to be seen in the terms butterflies, pond flies, caddis-flies, harvest-flies, all of which belong to different orders, and not one of them to the Diptera. Another example of this is to be found in the expression 'candle-flies,' by which many people in the West Indies designate practically all the small insects that are attracted to the house lights at night. This term is used to include small moths (Lepidoptera), beetles (Coleoptera), flies (Diptera), and occasionally water-bugs (Hemiptera).

The characters which distinguish flies from other insects are that the adults never have more than one pair of wings; a few are wingless. In addition to the wings of the flies there are a pair of *halteres* (sometimes called balancers) in the place usually occupied by the hinder pair of wings in other orders. These are small knobbed organs which are usually plainly to be seen. The wings are membranous, usually transparent, and without scales, except in the case of mosquitos and closely related insects. The mouth parts of the flies are adapted for piercing and sucking or for lapping. Many flies are capable of inflicting a very painful 'bite,' but none of them are capable of biting in the same way as the beetles or the grasshoppers.

The larvae of flies are known as maggots. They are usually footless grubs, and they vary greatly in their mode of life and in their habitat. Flies pass through a complete metamorphosis, including egg, larva, pupa, and imago. The eggs are deposited in a great variety of places according to the habitat of the different species and the food of the larvae. In the case of certain species, the young are born alive. This might seem to be a striking exception to the general rule of insect embryology, but it merely means that the eggs are hatched within the body of the female parent fly.

The order Diptera is one of the most important of all orders of insects. Not only does it include agricultural pests of the first importance, such as the Hessian fly, the fruit fly; and household pests, such as the house fly, but it also includes those insects which are directly dangerous to human life as carriers of disease, such as mosquitos, the tse-tse fly, and others.

The number of species of flies already known to science is about 40,000, and it is estimated that when all the existing species become known the number will reach a total of 350,000. In the case of certain species of this order, the number of individuals in existence at any one time is enormous. Especially is this true wherever flies find favourable breeding places and plenty of food for the larvae. Instances in point are the house fly, any species of mosquito, and the pomace flies, which are attracted to all kinds of decaying fruit.

It will be impossible in this brief review to do more than mention a few of the important insects of this order which occur in the West Indies.

Among the Diptera with long antennae the mosquitos (Culicidae) are the most important. These small insects are a source of annoyance in nearly all parts of the world, and in all latitudes, by day and night. Many of them also are of great importance on account of transmitting some of the most deadly diseases of mankind. Yellow fever and malaria, which have at times made certain localities almost uninhabitable, as well as the repulsive filaria, are mosquito-borne diseases.

The life-history of mosquitos in general is as follows: The eggs are laid in water; the larvae are aquatic, breathing air by means of a respiratory tube which is brought to the surface and placed in communication with the air above. The larva feeds on minute organic particles and microscopic animals. On account of this feeding habit the larvae of mosquitos may be classed as scavengers, agreeing in this respect with many other species of Diptera. The pupa is free moving, but does not feed, and is a true pupa, the change from the larval to the pupal stage being as complete as in the case of the Lepidoptera, in spite of the fact that the insect at this time has a considerable power of movement and locomotion. The length of the life cycle in mosquitos varies with the species, and with conditions of climate, etc. Certain species are able to complete the entire life cycle in a few weeks, while others require much longer. It has been found also that under certain conditions, the length of time required for development is much greater than usual.

The species of mosquitos found in the West Indies which are of most interest are those which carry yellow fever, malaria, and filaria. The malarial mosquito (*Anopheles*) does not occur in Barbados, although it is known in all other parts of the American tropics. The yellow fever mosquito (*Stegomyia*) is abundant in these islands, being known commonly as the day mosquito or 'Scots grey.' The filaria-carrying mosquitos belong to the genus *Culex*. The female adult mosquitos feed on blood when they have the opportunity; at other times they probably feed on the juices of flowers and fruits. The males feed entirely on flowers and fruits, their mouth parts not being adapted for piercing, and for sucking blood.

The measures to be adopted against mosquitos fall under several heads. It is possible to prevent the development of mosquitos, within certain limits, by doing away with their breeding places. This is accomplished by draining swamps, filling in ponds, and clearing away all receptacles in which water might collect and so furnish suitable places for breeding. The *Anopheles* mosquito breeds only in fairly permanent, natural pools, and in streams. These may be stocked with small fish such as the 'millions' (*Girardinus poeciloides*) of Barbados, as has been done at St. Kitt's-Nevis, Antigua, and other places. These fish may also be used to stock fountains, tubs, etc., in which water is kept, and in this way mosquitos may be prevented from breeding in the water, as the fish are very voracious and feed on the mosquito eggs, larvae, and pupae. It is to the presence and abundance of millions in Barbados that the absence of malaria is attributed. 'Millions' inhabit the natural breeding places of *Anopheles*, but other species of mosquitos naturally breed in places not accessible to these small fish. All cisterns, pools, etc., that cannot be either stocked with fish or drained, as already suggested, should be treated to applications of kerosene or petroleum at intervals of a fortnight.

The use of the mosquito net at night is strongly to be commended. Citronella oil lightly smeared on hands and feet will often keep off mosquitos when no such net is available. In case of an extreme abundance of these insects, however, the mixture of oil of Pennyroyal 1 part, oil of tar 2 parts, and olive or cotton-seed oil 2 parts, may be found more efficient than the citronella oil, while in other instances of very mild attack, the citronella oil may be used, mixed with an equal amount of olive oil. As a relief to the pain and irritation often caused by the bite of mosquitos, ammonia applied to the spot has been found useful.

(To be Continued.)

SCIENCE NOTES.

Excretion of Toxic Substances by the Roots of Plants.

The following review on the subject of the excretion of toxic substances by the roots of plants appeared in *Nature* of August 27 last, and should be of interest, since it deals with a question that has of late received a considerable amount of attention in the United States, and by scientific experimenters in other countries. A summarized account of the work in connexion with this subject of Mr. F. Fletcher, M.A., B.Sc., recently Deputy Director of Agriculture, Bombay, was given in the *Agricultural News* (Vol. VII, p. 238): —

The idea formulated a century ago by de Candolle that plant roots excrete toxic substances has recently been very much pushed forward by the American Bureau of Soils to explain the effects of fertilizers and the advantage of a rotation of crops. The American method of experiment is to grow seedlings in water culture for a few days, and measure the amount of transpiration, which is considered to be an index of the amount of growth. The seedlings are then removed and replaced by a second batch, without changing the water; the rate of transpiration is found to be diminished, showing (it is stated) that a toxic body excreted by the roots of the first batch is adversely affecting the second. Further, seedlings grown in an aqueous extract of certain poor soils are found to transpire less water than others grown in distilled water, and it is concluded that these soils contain some toxic material, presumably excreted by plants. The toxic body is, however, precipitated on addition of charcoal, ferric hydrate, and solutions of various manures; and the Bureau of Soils argues that the function of fertilizers, in some cases at any rate, is not to feed the plant, but to precipitate the toxin excreted by previous plants. Rotations of crops are of advantage, because the toxin (poisonous material) excreted by one plant is not necessarily harmful to plants of a different order.

It cannot be said that any very convincing evidence is offered in support of this view by the workers in the United States, and the assumption that transpiration is a measure of plant growth is not borne out by any of the figures quoted.

Another weak point is that the experiments are made with seedlings, and last only a few days instead of being carried on to the end of the plant's life. The nutrition of the seedling is not the same as that of the plant, and even if it were demonstrated that excretion from seedling roots took place, it would not follow that there was a similar excretion from the roots of fully grown plants.

In the last *Bulletin* from the Soil Bureau (No. 48) an account is given of more than 13,000 pot trials with soils from different parts of the United States. The results show, as might be expected, that addition of manures increases the crop, and that each manurial substance exerts a specific effect which is not shown by any other; with this statement everyone would agree. The further conclusion is drawn that the character of fertilizer required depends more upon local conditions and practices (such as the crops grown, etc.) than on the type of soil or the geological formation to which it belongs, so that the fertilizers required for the same type of soil occurring in different localities usually vary more than those required for very different types when in the same locality and subjected to similar environment. If this generalization turned out to be true, it would be more easy to reconcile it with the view that the chief use of manures is to precipitate the poisonous matter excreted by the roots of plants than with the ordinarily accepted idea that manures are applied in order to provide the necessary plant food. An examination of the tables given, however, does not show that there is any proof.

Mr. Fletcher's work has been partly on the above lines. He obtained a 'solution of excreta' by growing plants in water culture, and then used this solution as a medium for plant growth. It proved to be toxic, and the conclusion is drawn that the plant first used excreted some poisonous body. The experiment, however, is not a very good one. It is well known by those who have worked with water cultures that bacterial decompositions are liable to take place in the solution, producing substances injurious to plants; precautions always have to be taken to prevent development of bacteria. It does not appear that any such precautions were taken by Mr. Fletcher; indeed, the conditions under which he worked seem to have been favourable to bacterial development; well water was used and the 'solution of excreta' was allowed to evaporate at ordinary temperature until sufficiently concentrated for the second part of the experiment. There is no evidence that the toxic substance was excreted by the plant; it might equally well have been a bacterial product.

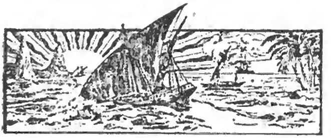
In another set of experiments, crops were grown in rows side by side, and three lots of measurements were taken: — (1) the yield on the outside row, bordering on the bare ground; (2) the yield in the middle row; (3) the yield in a row bordering on another crop. The first is the highest, the second shows the effect of the plant on others of the same kind, and the third shows the effect on others of a different kind. The falling off in yield in the second and third cases is regarded by Mr. Fletcher as proof of a toxic excretion. Such a falling off is generally explained as due to lack of water or food, and no satisfactory evidence is adduced against this view; indeed, Mr. Fletcher states that the reductions in crop are less marked under a more evenly distributed rainfall.

SISAL HEMP IN GERMAN EAST AFRICA.

Attention has been given to sisal hemp cultivation in German East Africa since 1893, and the increasing value of the industry is evident from the fact that the exports of fibre during 1906 were valued at £66,900, as compared with £43,900 in 1905 and £28,300 in 1904.

The industry was started by the importation of a small number of plants from Florida fifteen years ago. Machinery for the extraction of the fibre was imported in 1899, and the first exports were made in 1900. In 1904, the number of plants dealt with was 1,300,000, which yielded 624 tons of fibre, this being equivalent to an average yield of 17 oz. of fibre per plant. In the following year the average return of fibre rose to 25 oz. per plant, but in 1906 it dropped to 22 oz. It is calculated that if 800 plants per acre are grown, an annual crop of 900 to 1,200 lb. per acre should be obtained.

The machine employed for the extraction of the fibre is the one used in Yucatan, and is known as the 'Molla.' It costs £650, is capable of dealing with about 100,000 leaves in ten hours, and requires 48 horse power to drive it. In order to keep this machine sufficiently employed, a plantation of at least 600,000 plants is necessary. This (allowing distances of 3½ × 8½ feet between the plants) represents an area of about 310 acres.



GLEANINGS.

Import duty was formerly levied on all live stock brought into Jamaica, but the duty on stock imported for breeding purposes has lately been removed. This amounted to £3 per head on horses, £2 on cattle, £1 on asses, and 10*s.* per head on sheep, goats, and pigs.

The rainfall at Montserrat during 1907-8 was very deficient in quantity. At the Botanic Station only 51·83 inches were recorded as compared with 68·18 inches registered in the previous year. The highest fall was recorded at Woodlands—77·58 inches, and the lowest—37·34 inches—at Whites.

The amount of cacao (produced in the island) shipped from Trinidad during August of the present year was 1,810,016 ℔. This brings the total quantity exported, from January 1 to the end of August, up to 34,763,102 ℔., as compared with 30,100,066 ℔ shipped in the corresponding eight months of 1907.

With the object of extending a knowledge of improved agricultural methods in the country, the Government of Peru started the National School of Agriculture at Lima. This has lately undergone further development by the addition of a Farming School in connexion with the earlier establishment. The Farming School has for its object the training in practical agriculture of estate managers and overseers.

The report for 1907-8 of the Director of the Royal Botanic Gardens, Ceylon, states that further extensions of the rubber acreage in the island continued during the year under review, and the total area planted now amounts to 150,000 acres. The exports of rubber showed an increase of nearly 100 per cent., and for the year 1907-8 were valued at nearly £225,000.

About 100,000 acres of sugar-cane are annually reaped in Hawaii, and the average return per acre amounts from 4 to 4½ short tons of sugar. Under natural conditions about 2 to 3 tons per acre are obtained, but on the lands under irrigation, the average yield of sugar amounts to nearly 6 tons per acre. Considerably less than 10 tons of cane are required to give a ton of sugar, and in some instances 7 tons have been sufficient. (*International Sugar Journal.*)

The cultivation of pine-apples in Singapore has lately undergone considerable extension, with the result that the price of the fruit in the local markets was recently no more than 1c. each. Pine-apple canning is carried on on a large scale, this industry being chiefly in the hands of Chinese. Cocoa-nut palms and rubber trees are being planted through many of the pine-apple fields, with the object of providing permanent crops. (*Agricultural Bulletin of Malay States.*)

A stall for the sale to farmers and others of economic plants from the British Guiana Botanic Gardens is kept up in the Stabroek Market, Georgetown. During the three months ending June 30 last, the number of plants sold in this way was 1,312, which realized $40·81. These plants included cacao, 266; coffee, 235; nutmeg, 89; and orange, 87.

Experiments in the cultivation of Caravonica cotton are being carried on in the Sudan at Khartoum, Kamlin, and Kassala, but the Director of Agriculture and Lands of the Sudan Government in a recent report states that neither the growth of the plants, nor the quality of the cotton produced has come up to the expectations that were at one time entertained in regard to this crop.

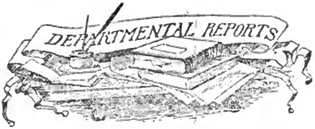
Steadily increasing exports of bananas are being made from Surinam to New York. On September 5, the S.S. 'Marsurge' shipped a cargo of 6,473 bunches, made up as follows: 3,649 bunches of nine hands, 2,016 bunches of eight hands, and 828 bunches of seven hands. According to the *Port-of-Spain Gazette*, it is the opinion of many planters that as many as 2,000 bunches of bananas per week will be exported from the colony.

A recent issue of the *Board of Trade Journal* mentions that the process which has lately been patented for the extraction of wax from the epidermis of the sugar-cane will be adopted on over a hundred estates in Java during the coming reaping season. It is estimated that about 1 ℔. of wax will be recovered from a ton of cane. The product is somewhat similar to Carnauba wax, and can, it is thought, be used for the manufacture of phonograph records.

The sugar crop of the Argentine republic for the year 1907 amounted to 109,000 tons, while the annual consumption of sugar in the country amounts to about 150,000 tons. Imports of this product are made from Brazil, Peru, Mauritius, and Germany. Agriculture in the Argentine is generally in a very backward condition, although it is believed that good crops of sugar, rice, cotton, tobacco, and tropical fruits might be produced in the northern part of the country. (British *Consular Report.*)

The *Kew Bulletin* (No. 7, 1908) contains a note mentioning that specimens of *Pilocarpus racemosus*, in flower and fruit, were lately received at Kew Gardens from Sir Daniel Morris. These specimens were collected in the northern part of Montserrat by Mr. W. Robson, Curator of the Botanic Station. *P. racemosus* is the only native West Indian species of the genus, and is a strong-smelling shrub from 6 to 16 feet high.

With the exception of one or two local showers, practically no rainfall was experienced at Barbados during the first three weeks of September. The record for the island from January 1 to August 31—21·36 inches—is, with two exceptions (1894 and 1898), the lowest fall registered for the corresponding period during the past twenty-two years. It is satisfactory to be able to report that the serious state of affairs brought about by the long drought has been considerably relieved over the greater part of the island by heavy showers which fell on the night of September 24, and on the following morning. In several districts rather more than 4 inches of rain were recorded within twelve hours. On the other hand, no more than from 3 to 60 parts of rain were registered on certain estates in St. Philip and Christ Church parishes.



MONTSERRAT: ANNUAL REPORT ON THE BOTANIC STATION AND EXPERIMENT PLOTS, 1907-8.

The report of the Curator states that the expenditure on the Botanic Station and on the Experiment Plots at Harris' and Olveston amounted to £602 9*s.* 9*d.*, while the receipts from the sale of plants, etc., for the year amounted to £43 0*s.* 11½*d.*

Owing to the increased attention given to Sea Island cotton cultivation there has been a great falling off in the number of economic plants distributed in the island. Only 3,296 plants were sent out, in addition to a large number of cuttings of cassava and sweet potatos as compared with 11,975 in the previous year. The decrease is especially noticeable in the case of limes and cacao.

A number of interesting experiments in the cultivation of Sea Island cotton, onions, Irish potatos, and other provision crops, as well as with cacao, limes, etc., are in progress at the Stations, and the results are set out in detail in the report. The Sea Island cotton plot at Grove Station indicated, for the third year in succession, that close planting in the rows (5 feet × 1½ feet) is likely to give the highest returns. The value of frequent cultivation between the rows, as influencing the yield of cotton obtained, is also evident. The opinion is expressed, as the result of experimental cultivation, that the growth of English vegetables in Montserrat is worthy of more attention than it receives at present.

Notable progress has been made in the cotton industry, the area planted for the year being 2,100 acres as compared with 1,050 acres in 1906-7. A considerable acreage was planted by the peasantry. The exports of lint show an advance from 160,000 lb. in 1906-7 to 360,000 lb. in 1907-8. An appendix to the report gives details of the results of manurial experiments carried out in the island.

The efforts to improve the local breeds of stock in Montserrat were continued during the year. Two pedigree bulls, of the Devon and Hereford breeds respectively, were maintained in the island for service, a privilege of which advantage was taken by a considerable number of stock-owners.

BRITISH GUIANA: ANNUAL REPORT ON THE BOTANIC GARDENS, 1907-8. By A. W. Bartlett, B.A., B.Sc., F.L.S., Government Botanist.

During the year under review 20,724 plants of various kinds were raised in the nursery and planted out in the Botanic Gardens. The great variety of plants dealt with is indicated by the fact that the different kinds of seeds sown numbered 744.

Para rubber plants (*Hevea brasiliensis*) were raised in large quantity at the nursery, from seed imported from Singapore. The seeds were packed in burnt rice dust, and forwarded by parcel post in 1-lb. biscuit tins. One lot of seed germinated to the extent of 80 per cent. and a second lot 64·4 per cent. of the whole. About 50,000 Para rubber plants were raised, all of which found ready sale.

Two or three kinds of coffee are experimentally grown at the Botanic Gardens. Among these are included the Maragogipe variety—the seeds of which were obtained from Jamaica—*Coffea robusta*, *C. stenophylla*, and *C. stenophylla hybrid*. The berries from *C. robusta*, which are small, dark red in colour, and with a thin pulp, are all being sown.

Two varieties of English potatos were experimentally grown, but gave only a very poor return.

Seeds of the black Bengal bean (*Mucuna* sp.) were sown on one plot, and the plants made excellent growth, covering the whole bed, and effectively keeping down weeds.

A number of vegetables were grown in the Model Kitchen Garden. The 'Jersey Wakefield' cabbage gave excellent returns, while the 'Surehead' and 'Allhead' were also satisfactory. Among tomatos the 'American Matchless' was the most successful variety tried, while in the experiments with egg-plants, 'Black Beauty' produced the largest and handsomest fruits. 'May King' and 'Tom Thumb' head the list of varieties of lettuce grown, and 'Carolina Pole Lima' was best among the beans cultivated.

The total number of economic plants sent out from the Botanic Gardens numbered 58,564. These included 44,398 Para rubber plants, 2,475 Castilloa rubber plants, 2,730 cacao, and 2,301 coffee plants. Ornamental plants to the number of 1,559 were also distributed. The total receipts from the sale of plants, etc., amounted to $2,384·18, or more than double those of last year. This is chiefly accounted for by the large sales of Para rubber plants, and to a much less extent, by the receipts from the stall lately started in the Stabroek market, for the sale of economic plants.

The total rainfall for the year 1907 was 109·24 inches, which is 16·80 inches higher than the average of the previous twenty-eight years.

CEYLON: ANNUAL REPORT ON THE ROYAL BOTANIC GARDENS, 1907. By J. C. Willis, M.A., F.L.S., Director.

Mr Willis states in his report that the work of the year has been largely devoted to improving the condition of the Experiment Station at Peradeniya. With this object, the cacao and other trees in the older parts have been pruned and thinned and new plots have been planted. Agriculture in general was prosperous in Ceylon during 1907. The extension of the rubber area continued in the earlier part of the year, but a drop in the price of rubber, and a simultaneous rise in the price of tea attracted more attention to the latter product. The stem-bleeding disease (*Thielaviopsis ethaceticus*) of the cocoa-nut palm has spread considerably during the year, and since the cocoa-nut crop is the one that occupies the largest area of any in Ceylon, this has caused considerable anxiety.

The reports of the Government Entomologist, Mycologist, Chemist, and Curators of the Experiment Stations, together with that of the Superintendent of School Gardens, etc., are issued as supplements to the report of the Director.

School Garden work is evidently progressing in Ceylon judging from the report of the Superintendent of that branch of Agricultural instruction. In 1907, the number of gardens worked was 134, as against 122 in the preceding year. During the year under review forty-two schools were given implements and twelve supplied with wire fencing. Prizes are awarded by the Government and the Agricultural Society for the best cultivated gardens. About 6,500 packets of seeds and nearly 1,000 plants, bulbs, and cuttings were distributed to the gardens, this being practically double the quantity sent out last year.

FISH OF THE CARIBBEAN SEAS.

Under the above title an interesting article dealing with the chief fish of the West Indian Seas, and the methods used in capturing them appears in the June number of *Tropical and Subtropical America.*

It is pointed out that the Caribbean Sea swarms with fish of many kinds, many of them being of the greatest value for food purposes, but owing partly to the antiquated methods adopted by the fishermen, full advantage is not taken of this source of food supply.

In discussing the chief fish found in the Caribbean Seas, reference is first made to the well-known flying fish. This includes a number of species all much alike in general appearance, the fish being greenish-black or steel-blue above, and silvery below. Under favourable conditions flying fish attain a length of from 12 to 15 inches, and a weight of from 1½ to 2 ℔. Barbados is the island where the flying fish industry is of the most importance, and there a large number of boats and a small army of men are engaged in connexion with it. The method of capturing flying fish by means of seine nets is described, but it may be stated that at Barbados the flying fish are usually caught by means of a circular dipping net. It is also mentioned that Spanish mackerel, 'jack,' and other small fish are captured in a somewhat similar way. Speaking generally the small fish are caught in seines, cast nets, and fish pots, while the large fish, among which may be included the dolphin, the barracouta, red snappers, the albacore or 'tuna,' and the King-fish or 'cero,' are captured by hook and line.

The albacore is found in the seas around Barbados, and other islands, and is the largest of any Caribbean fish caught by hand line. Not infrequently it attains a weight of 200 ℔., while it is stated that occasionally specimens are found weighing as much as 1,000 ℔. The albacore is a strong, gamey, hard-fighting fish resembling the tarpon in these characteristics. Another fine tropical fish is the King-fish already mentioned, the flesh of which is of excellent flavour. In the West Indian seas it grows to a great size reaching 6 or 8 feet in length, and sometimes as much as 100 ℔. in weight, although the majority caught and sold for food purposes do not weigh more than 30 ℔. Large numbers of small fish are caught in large fish pots of somewhat antiquated pattern, and mostly constructed of split bamboo and palm leaves. Latterly many fishermen in the West Indies have adopted the use of wire netting in the construction of these fish pots, and it is stated that they obtain better results than with the bamboo pots.

Among the commonest fish caught in the pots are mentioned the squirrel-fish, banana fish, scarlet-hind, rock fish, groupers, and angel fish, as well as the parrot fish. Many of these fish are red in colour. This red colouring serves as a protective agency to the fish possessing it, for when viewed through blue water the red appears as a mere neutral tint.

Crabs and also the clawless lobster are sometimes found in these fish pots. The latter grows to a large size, often weighing 20 ℔.

Mention is made at the close of the article of sea turtles caught in the Caribbean seas. The headquarters of the turtle trade of the West Indies are at Kingston in Jamaica, most of the turtles being caught on the coral reef to the north of the island. In the past they have been so persistently hunted and their eggs destroyed in such large numbers that in many localities they are now on the verge of extinction. In Barbados, at least, legislative efforts have recently been made with the object of preventing this.

FEEDING VALUE AND FLAVOUR OF NUTS.

An interesting article in the *Yearbook* of the United States Department of Agriculture (1906) deals with the use of nuts as food for man, and gives a large amount of information as to the composition, value, and digestibility of these fruits.

As is pointed out in the article referred to, the term 'nut' is not a definite one—botanically speaking—but is applied indiscriminately to a variety of certain fruits, or parts of fruits, and implies a more or less hard, woody covering, surrounding a meat or kernel. The fact that nuts form a concentrated class of food-stuffs, owing to their general richness in fats and proteins—the two most valuable of nutritive constituents—is very evident from a consideration of the tabulated results of analysis of a large number of different kinds of nuts, given in the article. Oil or fat is very commonly a prominent constituent of nuts. The hickory nut (*Carya* sp.) contains 67·4 per cent. of oil, the Brazil nut (*Bertholletia excelsa*), 65 per cent., the candle-nut (*Aleurites triloba*), 61·7 per cent., the butter-nut (*Caryocar nuciferum*), 61·2 per cent., the walnut (*Juglans regia*), 60·7 per cent., the cocoa-nut 56·2, the almond 54·4, and the ground nut (*Arachis hypogaea*) 43·5 per cent.

Several of the above, as well as others, are also rich in protein or albuminous matter—that constituent of foods which goes to form muscles or red meat in the animal body. In the ground nut the proportion of protein reaches 29·8 per cent., while in the case of the butter-nut the protein comprises 27·9 per cent. Other nuts rich in albuminoid matter are the pistachio, 22·6 per cent.; the Paradise nut of South America (which resembles the Brazil nut in appearance and flavour), about 22·2 per cent.; the almond and the candle-nut, each 21·4 per cent.; the walnut, 18·2 per cent., and the Brazil nut, 17·4 per cent. The proportion of albuminoid matter in the cocoa-nut comprises only 6·6 per cent.

Only a few of the commonly used nuts contain a large proportion of carbohydrate matter. Among these the dry chestnut, with 73·0 per cent., ranks highest.

When it is considered that the proportion of protein in an average beef steak comprises 19·8 per cent., and of fat 13·6 per cent., that in Cheddar cheese the protein percentage may be taken as 27·7 and the fat percentage as 36·8, and that boiled eggs contain 12·4 per cent. of albuminoid matter, and 10·7 per cent. of fat, it will be seen that the food value of nuts, as deduced from their percentage composition of nutritive matter, is, generally speaking, a high one. This food value is somewhat depreciated on account of the fact that the nutritive constituents, more especially the protein matter, are not so easily digested as the corresponding constituents of meat, but the opinion is expressed by the writer of the article that this inferior digestibility is, to a large extent, due to imperfect mastication of the nuts.

The flavour of nuts is to a large extent due to the oils present, though in some kinds there are also certain specific flavouring bodies. The nut oils readily become rancid, and the disagreeable flavour of spoiled nuts is due to this property.

The almond possesses a hydrocyanic acid flavour, which is characteristic of the kernels of peach stones, plum stones, etc., and this might be expected when it is remembered that the almond is the dried kernel of an inedible fruit, which somewhat resembles the peach in appearance, and is closely related to it botanically. Most almonds are mild-flavoured, though in the so-called bitter almonds the glucoside which yields the cyanic acid is more abundant.

LETTUCE CULTIVATION.

The lettuce crop is one of those minor vegetable products to which much more attention might be paid by small cultivators in the West Indies than is at present the case. Lettuce is a product which from its refreshing and cooling nature is always acceptable in the tropics—a fact which ensures it a ready sale, and considering the ease with which it can be cultivated, there is no reason why everyone who has a small plot of garden should not have a supply of the vegetable all the year round.

A *Bulletin* has lately been issued from the Central Agricultural Experiment Station, Cuba, dealing with lettuce cultivation. It is stated that over forty varieties have been under experiment at the station, and have given very excellent results. Lettuce plants should, of course, be first raised in a small seed-bed, and afterwards transplanted to the plots where they are to develop. The soil of the seed-bed should be very fine and mellow, and should be rich in humus or vegetable manure. Lettuce seed is small and light, and should be sown rather thickly, across the bed in rows from 2 to 3 inches wide, but not deeper than from ¼ to ½ inch. The soil should be pressed firmly down over the seeds.

At the Cuban Experiment Station the young lettuce plants were first transplanted into rows 4 inches wide, and with the plants 2 inches apart in the row. Three weeks later when the plants were large and strong, and possessed from four to six well-formed leaves, they were again transplanted, this time being set out in the field. It is advisable that the young plants should be shaded from the sun for a few days after they have been transplanted. Of course when the crop is grown only on a small scale in garden plots, two transplantations are not necessary. The cultivator must bear in mind, however, the importance of allowing the young plants plenty of room to develop. A distance of 12 to 15 inches each way should be allowed between the plants in the permanent beds. The soil in the permanent beds should be cultivated to a depth of 5 or 6 inches, and the surface should be smooth and mellow when the plants are set out. All heavy clods, stones, grass, etc., should be removed beforehand. To obtain lettuce of the best quality, the vegetable must be grown quickly, and for this to take place the soil should be moist and exceedingly well supplied with vegetable matter. The organic matter may best be supplied by a dressing of pen manure, well worked into the soil. In transplanting, the soil should be pressed around the roots of the young plants, and the ground, if dry, should be well watered as they are set out.

The authors of the Cuban bulletin state that on most soils the lettuce crop will pay for a fairly liberal dressing of artificial manure, in addition to the pen manure mentioned above. They recommend a mixture of two parts of sulphate of ammonia, one part of sulphate of potash, and three parts of superphosphate, this mixture to be applied at the rate of about 1,200 lb. per acre. This should be raked or harrowed into the soil about ten days before the plants are set out. The soil between the rows of lettuce should be regularly hoed and cultivated after the crop has started, since there is nothing which helps the growing of the young plants so much as keeping the surface of the ground frequently and thoroughly stirred. Hoeing is especially necessary after rain so as to prevent the soil from baking, and to keep a coating of fine loose soil over the surface. The advisability of providing shade for the young lettuce plants was tested at the Cuban Experiment Station by the use of a large cheese cloth, but the results indicate that this practice is not one to be recommended.

It was mentioned above that over forty varieties were tested in the Cuban experiments. Many of these have done exceedingly well and the following varieties are especially recommended: Hubbard Market, Big Boston, California Cream Butter, Tennis Ball Black-seeded, Deacon, Iceberg, and New York.

THE DIGESTIBILITY OF PRICKLY PEAR WHEN FED TO CATTLE.

A pamphlet has lately been issued by the United States Department of Agriculture (*Bulletin 106* of the Bureau of Animal Industry) containing a detailed report on a lengthy series of experiments conducted at the College of Agriculture, New Mexico, in order to test the digestibility of the cacti known as 'prickly pear' (*Opuntia* spp.) when fed, both alone and in conjunction with other foods, to cattle.

Previous bulletins issued by the Department have given analyses showing the chemical composition of a large number of cacti, including prickly pear, but since the value of a material as a food is not determined solely by its composition, it is necessary also to know the percentage digestibility of the nutrients found present by the chemist.

The mode in which the digestion experiments are conducted is simple. First the animal is fed on the feeding stuff for a few days until all other feeds have been removed from the alimentary canal. The animal is then, under suitable conditions, fed with a weighed amount of the feeding stuff, the composition of which is determined by analysis. All the liquid and solid excreta is collected, weighed, and analysed, and the amount of nutrients it is found to contain is subtracted from the amount of the corresponding nutrients fed. In this way the percentage of each constituent digested is ascertained.

The following were among the conclusions arrived at as a result of the experiments:—

The average digestibility of the nutritive constituents of prickly pear (*Opuntia* spp.), fed alone, were: dry matter, from 63·96 to 65·86 per cent.; ash, 33·68 to 35·81 per cent.; albuminoids, 40·87 to 57·47 per cent.; fat, 68·38 to 69·02 per cent.; carbohydrates (starches, sugars, etc.), 78·95 to 81·78 per cent., and fibre, 41·32 to 53·99 per cent.

Compared with ordinary green fodder foods, it may be said that the above figures show a somewhat low digestibility for the albuminoids of prickly pear, a very low digestibility for the ash, but a very good digestibility for the carbohydrates. Taken altogether, the digestibility of the various constituents is about the same as that of immature green maize fodder.

When prickly pear is fed with well-cured fodder, as hay for instance, or oats, cotton-seed meal, etc., the digestibility of both materials is increased. In these cases the prickly pear has a greater food value than the above figures would seem to indicate.

The albuminoid ratio, i.e., the ratio of albuminous, or nitrogenous constituents to carbohydrates, is very low in prickly pear. Hence, much better results will always be obtained when it is fed with some food rich in nitrogenous constituents, as pea, or bean, or cotton-seed meal.

It is suggested that a satisfactory ration for milch cows would consist of 50 lb. of chopped prickly pear, 5 lb. of cotton-seed meal, and a small amount of rough cured fodder, as hay or straw.

MARKET REPORTS.

London,—September 15, 1908, The West India Committee Circular; Messrs. Kearton, Piper & Co., September 15, 1908.

Arrowroot—1⅝d. to 2½d. per lb.
Balata—Sheet, 2/1 to 2/4; block, no quotations.
Bees'-wax—Good quality, £7 7s. 6d. per cwt.
Cacao—Trinidad, 60/- to 76/- per cwt.; Grenada, 52/- to 61/- per cwt.
Coffee—Santos, 26s. 6d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £17 to £17 10s. per ton.
Cotton—St. Vincent, 14d. to 15d.; Barbados, 14d. to 15d.; St. Kitt's, 14d. to 15d.; Montserrat, 14d. to 15d. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—Very slow of sale; 2/6 to 3/- per box.
  Pine-apples—St. Michael, 1/6 to 3/6 each.
  Grape Fruit—7/- to 10/- per box.
  Oranges—Jamaica, 9/- to 10/- per box.
Fustic—£3 10s. to £4 10s. per ton.
Ginger—Dull.
Honey—19s. 6d. to 25s. per cwt.
Isinglass—West India lump, 2/1 to 2/4 per lb.; cake, no quotations.
Lime Juice—Raw, 1/- to 1/3 per gallon; concentrated, £15 2s. 6d. per cask of 108 gallons; distilled oil, 2/5 per lb.; hand-pressed, 4/6 per lb.
Logwood—£3 10s. to £4 4s. per ton; roots, no quotations.
Mace—Quiet: no quotations.
Nutmegs—Steady.
Pimento—Steady, but quiet.
Rum—Jamaica, 3/3 to 8/-; Demerara, 2/4 to 2/7 per gallon; Trinidad, no quotations.
Sugar—Crystals, 15/9 to 16/6 per cwt.; Muscovado, 14/4; Molasses, no quotations.

New York,—September 4, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 13c. to 18c.; Grenada, 12¾c. to 14c.; Trinidad, 13c. to 13⅝c.; Jamaica, 10¼c. to 12¼c. per lb.
Cocoa-nuts—Jamaica, select, $25·00 to $26·00; culls, no quotations; Trinidad, $25·00; culls, $15·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c. to 8¾c. per lb.
Ginger—10¾c. to 14c. per lb.
Goat Skins—Antigua and Barbados, dry flint, from 48c. to 49c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c. per lb., dry flint.
Grape Fruit—Jamaica, $6·00 to $7·00 per barrel.
Limes—$3·50 to $4·00 per barrel. Market over-stocked.
Mace—26c. to 32c. per lb.
Nutmegs—110's, 10¼c. per lb.
Oranges—Jamaica; $4·50 to $5·00 per barrel.
Pimento—2¼c. to 4c. per lb.
Sugar—Centrifugals, 96°, 3·90c.; Muscovados, 89°, 3·40c.; Molasses, 89°, 3·15c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., September 21, 1908; Messrs. Leacock & Co., September 26, 1908.

Arrowroot—St. Vincent, $4·10 to $4·50 per 100 lb.
Cacao—Dominica, $14·00 per 100 lb.
Cocoa-nuts—No quotations.
Coffee—Jamaica, $8·50 to $9·00 per 100 lb.
Hay—$1·15 to $1·20 per 100 lb.
Manures—Nitrate of soda, $62·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00; Sulphate of ammonia, $72·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·75 to $3·00 per 100 lb.
Potatos—Dutch, $2·80 per 160 lb.
Peas—Split, $6·50; Canada, no quotations.
Rice—Demerara, $6·10 (180 lb.); Patna, $3·50; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, September 19, 1908; Messrs. Sandbach, Parker & Co., September 18, 1908.

Arrowroot—St. Vincent, $9·50 to $10·00 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 14c. to 18c. per lb.
Cassava—60c. to 96c.
Cassava Starch—$7·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 10c. to 13c.; Jamaica 12c. per lb.
Dhal—$5·25 to $5·40 per bag of 168 lb.
Eddos—$1·32 per barrel.
Molasses—Yellow, no quotations: Dark, no quotations.
Onions—Madeira, 2¼c. to 2½c.; per lb.; Lisbon, no quotations; Dutch, no quotations.
Plantains—12c. to 28c. per bunch.
Potatos—English, no quotations.
Potatos—Sweet, Barbados, $1·20 to $1·80 per bag.
Rice—Ballam, $6·25; Creole, $5·50 to $5·60 for good; Seeta, $6·00.
Split Peas—$6·60 to $6·75 per bag (210 lb.); Lisbon, $4·50.
Tannias—$1·68 to $1·80 per bag.
Yams—White, $2·16; Buck, $2·40 per bag.
Sugar—Dark crystals, $2·00 to $2·20; Yellow, $3·00; White, $3·50 to $3·70; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
——— Cordwood—$2·40 to $2·64 per ton.

Trinidad,—September 19, 1908. Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $13·00 to $13·25 per fanega.
Cocoa-nuts—Selected, $21·00 per M. f.o.b.
Cocoa-nut Oil—65c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. to 8½c. per lb.
Copra—$3·00 to $3·15 per 100 lb.
Dhal—$4·60 to $4·70 per 2-bushel bag.
Onions—$1·40 to $1·50 per 100 lb. (retail).
Potatos—English, $1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $5·50 to $5·65 per bag.
Split Peas—$6·50 to $6·75 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

AGRICULTURAL NEWS

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West Indian Cotton Growing.

NOW that full reports of the proceedings at the late Lancashire Cotton Conference have come to hand, the attention of planters may well be drawn to one or two points of especial interest among those discussed.

The question of the prices obtained for their product has caused some uneasiness among growers in the West Indies during the past season, and the opinion has been expressed in some quarters that the supply of cotton grown in these islands has already overtaken the existing Lancashire demand for lint of the particular degree of fineness. This view of affairs was, however, stated by Mr. J. Arthur Hutton, Chairman of the Council of the British Cotton-growing Association, to be quite a wrong one There was no danger whatever of over-production of Sea Island cotton in the West Indies. But Mr. Hutton pointed out that planters, outside of St. Vincent, were making a mistake if they aimed at growing cotton of the finest grade and longest staple. For this class of produce there was indeed but a limited demand. What was wanted, and for which there would always be a good market at remunerative prices, was a stronger and more generally serviceable kind of lint, of the second grade of fineness. Such a type of cotton had lately been produced by a planter at Barbados (see *Agricultural News* of May 2 last, page 134), and growers would be well advised to devote their energies to the production of cotton of the kind mentioned.

Mr. Hutton attributed the low prices obtained for Sea Island cotton in the past season to general trade depression. Rubber and other products were also suffering in the same way ; a little more than a year ago the best rubber commanded a price of 5*s*. per lb., whereas to-day it was only worth about half that sum.

It was pointed out by Sir Daniel Morris that the profitable nature or otherwise of cotton growing in the West Indies depended as much upon the yield of lint obtained per acre, as upon the market price of the product. If it were possible to obtain returns of 200 lb. to 250 lb. per acre, the industry would be a comparatively sound one, even at the present moderate prices. Growers could not regulate the market price, but it was an undoubted fact that the power of improving the conditions of the industry and the average return per acre was well within their reach, provided they devoted close attention to seed selection, and planted the varieties best suited to local conditions. The possibilities that lay in this direction were evident from the work done by one grower at Barbados, and already referred to. By careful attention to seed selection, in co-operation with the Imperial Department of Agriculture, with the object of raising a more hardy and prolific race of plants, this planter had succeeded in producing a type of cotton which has been recognized as the most useful kind ever grown in the West Indies. In addition, this particular sort gave a heavier yield than any other variety, and was said, also, to be less liable to disease.

The returns of cotton obtained in some parts of the West Indies were undoubtedly in many cases diminished by disease, but the Imperial Commissioner expressed his conviction, that if planters were to regularly follow the advice given them by the Imperial Department of Agriculture there would be much less disease. Whole fields of old cotton, covered with scale insects, or affected with other pests, may not infrequently be seen side by side with young cotton, and no industry can possibly flourish under such conditions. To limit the ravages of disease, common action must be taken in each island or district. This has been done in Montserrat with excellent results. In the early days of the industry in that island the cotton plants were badly attacked by the leaf-blister mite and by black boll, and the average returns per acre were very discouraging. About three years ago, Montserrat growers, on the recommendation of the Imperial Department of Agriculture, agreed to plant selected seed only, to cultivate highly, and to get rid of all the old plants before starting with the new crop. The result of this system of working is evident from the fact that the highest average crop return yielded in any portion of the West Indies during the past season was obtained at Montserrat. This was at the rate of 175 lb. of lint per acre.

A point to which attention was drawn at the Conference by the Manchester spinners, and one which might profitably be considered by cotton growers, as another factor affecting the returns obtainable in their industry, is the manner in which cotton is baled and sent forward to England. With any commodity it is likely that the manner in which it is put up and placed on the market will have a certain influence on the price obtained. This is especially probable when neglect in sorting and forwarding in convenient lot entails extra trouble on the purchaser. It was mentioned by Mr. C. M. Wolstenholme, of the firm of Messrs. Wolstenholme & Holland, who have handled the greater part of the Sea Island cotton grown in the West Indies, that while cotton from Barbados came forward very well graded, and in convenient lots, this could not be said in regard to the other islands, with the possible exception of Antigua. It was stated that many planters, whose produce may amount to 10 bales, forward this in ten separate shipments, and with no effort made to assort the contents. It is obvious that the best returns cannot be obtained in such cases, and it is distinctly in the interest of planters to save their crop until 8 or 10 bales, all under one mark, can be sent forward at once. If the lint is well graded, the shipment sells more easily, and at a higher price.

It may be mentioned that among the papers laid before the Conference was one containing a statement showing the amount and estimated value of the cotton (lint and seed) exported from the West Indian colonies during the period from January 1, 1902, to June 30, 1908. From this it is satisfactory to note that the steady increase in value of the industry has been continued during the past year. For the year ended September 30, 1907, the weight of lint shipped was 2,013,698 lb., while the total value of the produce (lint and seed together) during that year was £186,510. At the time of the Manchester Conference, Customs returns were available only for the first nine months of the year 1907-8; but during this period the weight of lint exported totalled 2,648,613 lb., and the value of the lint and seed together reached £215,150.

SUGAR INDUSTRY.

Seedling Canes D. 130 and B. 306 in Mauritius.

The above two canes have been grown at the Agricultural Experiment Stations in Mauritius, and also on several estates in the island, during the past five years. The first crop of plant canes on a commercial scale was obtained in 1904. It would appear that while D. 130 has given very good results, the cane B. 306 is far from being satisfactory in the colony. The following details are taken from the latest annual report on the Agricultural Experiment Stations of Mauritius:—

Some few years ago the Chamber of Agriculture of Mauritius received samples of two seedling canes from Barbados, viz., canes D. 130 and B. 306. Cuttings were distributed, and these two varieties are now cultivated over a fairly large area in the island. The stalks of the canes are white in colour when mature; they possess a good percentage of sucrose, and generally it would appear that the new varieties are an acquisition on the greater number of estates. However, during 1906-7, and also in 1905-6, some complaints have been received from planters as to the quality of these seedling canes. The canes which are reported to be giving bad results are in almost all cases described by the planters as being of the D. 130 variety, but from the results obtained at the Experiment Stations we feel sure that some confusion has arisen over the two kinds, and that the name D. 130 has been more generally remembered, and is being applied indiscriminately to the two imported varieties. This is the more probable, because the two canes are very similar in appearance, the chief difference being that while the leaves of D. 130 are open and well spread out, those of B. 306 are shrivelled up, as if the plants are suffering from drought.

The cane D. 130 indeed grows strongly and vigorously in Mauritius, but from the second year after the plants were introduced into the island, it has been noticed that B. 306 has made only very poor growth. Numbers of plants of the latter variety died out in the plantings made at the Experiment Station, and the distribution of cuttings of this cane have lately been stopped: cuttings of D. 130 only are now sent out. The latter kind is much better known in Mauritius than the former and far more widely cultivated. On certain estates in the north of the island, D. 130 has been propagated on a large scale, and the managers are very satisfied with the results obtained.

It is evident, therefore, that those planters who complain of cane D. 130 are under a mistake as to the name of the variety, and that it is B. 306 alone which is unsatisfactory. Planters in the island are urged to verify this statement for themselves before removing the seedling canes from their cultivations.

Though B. 306 is liable to attacks by fungoid diseases, D. 130 has resisted them successfully in Mauritius up to the present; and in the Gardens at Pamplemousses, while some rows of B. 306 have entirely died out, adjoining rows of D. 130 have constantly kept up a vigorous growth.

A tabular statement of the returns obtained in trials made at the Experiment Station with the two seedlings as plant canes and as ratoons, is given in the report. From this it appears that in the first year D. 130 yielded 15·14 tons of canes per acre, the juice of which contained 24·38 per cent. of sucrose. As first ratoons this cane yielded 16·33 tons of canes per acre with a sucrose percentage of 22·25, and as second ratoons, 19·2 tons of canes to the acre, with a percentage of sucrose equal to 23·23. In the fourth year the amount of canes reaped per acre fell to 13·13 tons, the sucrose percentage being 22·84 of the juice.

Cane B. 306 was grown as plant canes and as first ratoons only. In the first case a crop of 11·66 tons of canes per acre was reaped, the juice having a percentage of sucrose equal to 22·32, while as first ratoons the yield of canes was no more than 7·66 tons per acre, and the sucrose percentage 21·44.

Sugar Industry in Formosa.

Sugar production has recently received great attention in Formosa, and in view of the undoubted suitability of the southern portion of the island for cane cultivation, and the extensive market that exists for the produce in Japan alone, the industry is believed by those best qualified to judge to have great prospects of future development.

A lengthy account of the conditions of the Formosan sugar industry is given in the latest report of the British Consul at Tainan. From this it appears that production is increasing, and that in the course of a few years the output may be expected to reach from 200,000 to 240,000 tons per annum, as compared with about 70,000 tons of sugar twelve years ago.

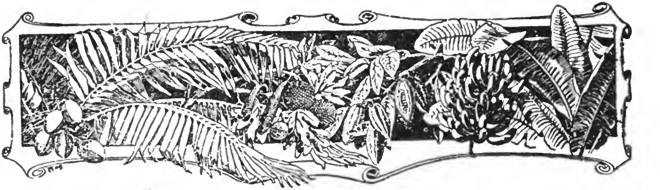
The soil and climatic conditions existing on the plains in the south of Formosa are described as being excellent for cane cultivation. The rainfall is well distributed and regular, which is a great advantage. There is also an abundant supply of waterways, so that a system of irrigation could be adopted if necessary.

Many modern factories, working on the central system, have lately been erected in Formosa, and nearly all the best land has been allotted to these mills. Labour is abundant and cheap, and a good deal of the land is let out by the mill owners, to small cultivators, who grow canes for sale to the factories. The price paid for these canes usually varies from about 8*s.* 9*d.* to 11*s.* 10*d.* per ton, the average during the past year being 10*s.* per ton. Now that a good number of modern factories exist in the island, the further development of the industry will best be brought about by the introduction of superior varieties of cane, better methods of cultivation—such as deep ploughing by means of steam ploughs, and by judicious applications of artificial manures to the different soils. The great extent to which the sugar-cane lands are divided up into small holdings would, however, probably be a difficulty in the way of the general adoption of deep cultivation by steam ploughs in Formosa.

It is stated that the modern mills, with up-to-date machinery, secure an extraction of 70 to 75 per cent. of juice, giving a sugar yield equal to from 9½ to 11 per cent. of the weight of cane.

The crop season in Formosa begins in November. Owing to shortage of rain at the time of planting, the 1907-8 crop has been smaller than that of the previous year. The total amount of raw sugar exported from this crop was 1,055,406 cwt., valued at £734,581, while from the 1906-7 crop 1,283,793 cwt., having a value of £848,718 were shipped abroad. With the exception of a very small quantity shipped to China and Hong-Kong, the whole of the sugar exports went to Japan. Prices during 1907-8 were low; the market at Tainan opened in November 1907 at 15*s.* 5*d.* per picul (133⅓ lb.), ordinary medium grade brown sugar, manufactured on the old system. In March last, the price was about 17*s.* 3*d.* per picul. The Consul states that white sugar produced by the modern factories commands a price of £1 7*s.* 1*d.* per picul in Formosa.

Formosan sugars are imported into Japan free of duty, while sugars from other countries have to pay import tax. The annual consumption of sugar in Japan is about 225,000 tons, so that the Formosan industry may yet undergo considerable expansion before it can furnish the whole of the supply needed by Japan.



WEST INDIAN FRUIT.

PINE-APPLE CULTURE IN FLORIDA.

The first shipments of pine-apples on a commercial scale were made from Florida in 1884, and the annual output has now reached over 500,000 crates. An account of the methods of planting, cultivating, and manuring the crop which have been found to give the best results in the State is given, with other particulars, in the numbers of *Tropical Life* for July and August last.

The chief pine-apple growing district of Florida extends over a long, narrow area of extremely sandy soil. This land possesses very little natural fertility, and the plant food required for growing the crop is supplied entirely by regular applications of artificial fertilizers. The soil has little water-retaining capacity, which is regarded as an advantage, since pine-apples cannot be produced with success on water-charged land.

The Red Spanish pine-apple is practically the only variety grown in Florida. Plantings of the crop are usually made during the rainy season (July, August and September). Propagation is effected chiefly by means of 'slips' produced from buds on the stem at the base of the fruit. Slips fruit in about twenty or twenty-two months from planting. Another method sometimes adopted is to plant 'suckers,' which result from buds produced on the lower leafy stem. A first fruiting is frequently given by suckers at the end of twelve months, but a sucker-set field crops very irregularly, and the fruiting period is a long one.

Before planting pine-apples it is essential that the land should be well cultivated, and the soil thoroughly pulverised and reduced to a fine condition. To bring about this condition, ploughing and cross-ploughing will be necessary, followed by harrowing with a wheel or disc harrow. Drainage is also essential, and this may best be ensured by the provision of trenches, about 14 inches wide and 14 inches deep, and at a distance of about 12 feet from each other (see *West Indian Bulletin*, Vol. VIII, p. 153). The pine-apples are thus grown on beds, about 12 feet wide, bounded by the drainage trenches, the soil being raked towards the middle of the bed, so that the centre is about 6 inches higher than at the edges of the trenches.

The young plants are set out at distances of about 20 by 20 inches, or 20 by 24 inches, and in this way there will be about 12,000 plants to the acre.

Surface cultivation with a scuffle hoe is regularly followed up on the best estates during the first two years after the slips are planted. In this way weeds are kept down, and a mulch of loose soil is maintained.

Soils on which pine-apples are grown are usually poor in character, and, as already mentioned, the soil in the Florida pine-apple district is naturally very wanting in fertility. On this account artificial fertilizers are necessarily applied on a generous scale, and the returns obtained warrant this practice. Experience indicates that potash is particularly required for the pine-apple crop, as might be expected from the nature of the soil on which it is usually grown. The fruit is deficient in quality if potash is not given in sufficient amount. A good supply of nitrogen and phosphoric acid is also important

Since chlorine is known to exercise a deleterious effect upon the produce, it is recommended that potash be applied to pine-apples in the form of high-grade sulphate, and not given as chlorine or in the form of kainit. Phosphoric acid should preferably be given as bone meal, or steamed bone dust, while basic slag has also given excellent results. Superphosphate is not recommended since it is found to produce a condition in the plants known as 'spike,' which is characterized by poor growth, narrow, constricted, greasy looking leaves, and worthless fruit.

Organic slow-acting forms of nitrogen, such as dried blood, cotton-seed meal, etc., are recommended for pine-apples in preference to quick-acting manures, such as nitrate of soda. The fertilizer applied to the crop should contain 4 per cent. phosphoric acid, 5 per cent. nitrogen, and 10 per cent. potash. A mixture of 900 lb. bone meal, 1,000 lb. cotton-seed meal, and 500 lb. high-grade sulphate of potash would meet the requirements. About 3,500 lb. of this mixture are recommended to be supplied annually on Florida pine-apple estates.

BEE-KEEPING IN CEYLON.

Instruction in the principles and methods of bee-keeping is included in the scheme of school garden work carried out in Ceylon, and the latest report of the Superintendent of School Gardens states that bee-keeping is an industry which is making steady, if somewhat slow, progress, in the colony.

Yellow Italian bees have been imported, and colonies of these as well as of the native variety are kept at the Government Stock Garden, where seeds and plants, etc. are produced for distribution to the school gardens. A grant has lately been made by the Ceylon Agricultural Society to aid in this branch of the work. A Cowan honey-extractor, and other requisites have been obtained, which will render possible the adoption of modern methods of practice, and serve as the means for useful demonstration. On the whole, it is stated that the outlook for the development of the bee-keeping industry in the island is decidedly hopeful.

AGRICULTURAL INDUSTRIES OF DUTCH GUIANA.

The *Annual Report* (1907) of the British Consul at Paramaribo, Dutch Guiana, gives an account of the progress that is being made in the agricultural industries of the colony. The following notes form an abstract of this portion of the report:—

BANANAS.

The cultivation of bananas for export, which was commenced in 1906, has not advanced so rapidly as was at one time expected. At the end of 1907 the total area planted was 4,940 acres. The reason for the slow progress was that planters were in the first place unwilling to act on the advice of experts in regard to the manner of cultivation. Latterly, however, this has been changed, and now that the best methods have been generally adopted, the prospects are bright, and it is confidently anticipated that banana growing will be a prosperous industry in the colony.

CACAO.

The total cacao crop for 1907 amounted to 1,386 tons, as compared with 1,311 tons in 1906, and 1,495 tons in 1905. The cacao exports for the year were 1,349 tons. In 1906 they were 1,480 tons.

It is reported that the cacao plantations are still suffering severely from the 'witch broom' disease, which not only results in an abnormal growth of bushy twigs, but also affects the pods, causing them to become excessively hard. Wholesale pruning has during the past year been undertaken, under the advice of the Agricultural Department of the colony. After pruning, the cuts are tarred over, and the lopped trees sprayed with a solution of sulphate of copper. This treatment, it is stated, has greatly reduced the proportion of affected pods, and it is expected that during the present year it will also be carried out on a number of other plantations.

COFFEE.

The return from the plantations of Liberian coffee increased from 116 tons in 1906 to 239 tons in 1907.

With the object of re-introducing and extending the cultivation of Arabian coffee some 50,000 plants of this variety were distributed to small holders (British Indian and creole) in the colony during the year. The Arabian coffee, it is mentioned, does well in Surinam, but until labour is cheaper and more plentiful, its cultivation cannot be undertaken on a large scale. This crop was largely grown in the colony about seventy or eighty years ago, and in the year 1830, the exports of Arabian coffee were about 3,000 tons. Its cultivation declined rapidly after the abolition of slavery in 1863.

RICE.

Considerable efforts are being made to develop rice growing in Surinam, in emulation of the flourishing industry of British Guiana. Large tracts of land, well suited to the crop, are available, and owing to steady immigration into the colony from the East Indies, the consumption of this cereal is certain to increase. The cultivation, however, progresses but slowly. In 1907 the rice crop amounted to 1,511 tons, as compared with 1,496 tons in 1906.

SUGAR.

The weather during 1907 was unfavourable for the sugar crop, and the return was somewhat smaller than usual. The output of sugar was 11,930 tons, as compared with 12,635 tons in 1906. Rum, however, was manufactured to the extent of 189,035 gallons, and 61,780 gallons of molasses were also produced.

RUBBER PRODUCTION IN THE CONGO FREE STATE.

From particulars published in recent *Consular Reports* it is evident that the Congo Free State is destined to become one of the great rubber-producing countries of the future. At present the exports amount, on the average, to a little over 4,800 tons of rubber per annum. In 1906, the actual quantity shipped was 4,848 tons, of the value of £1,950,000. It is understood that the exports for 1907 were about the same amount.

Rubber is obtained chiefly from vines (*Landolphia* spp. and *Carpodinus* spp.), as well as from trees (chiefly *Funtumia elastica*). Owing to reckless destruction of the plants by the natives in the process of gathering the produce, it is believed that the sources of wild rubber in many parts of the State have of late much diminished. With the object of counterbalancing this continual process of destruction, laws have been enacted that young trees shall be planted whose producing capacity at maturity shall be equal to the amount of rubber collected. Thus, at present, for every ton of rubber gathered, the collector must plant out five hundred young trees.

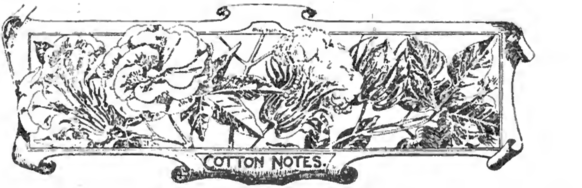
It has been proved by experiment that the rubber tree *Funtumia elastica* gives much earlier and better returns than the different varieties of vine rubber, and it is estimated that fully 13,000,000 plants of this kind have already been set out, capable of producing within a few years, and at a low estimate, 650 tons annually. Independently of this, the State has established three great centres of rubber cultivation, each of 250,000 acres. When the whole 750,000 acres have been planted, and are come into bearing, the total area is expected to produce 9,750 tons annually.

TOBACCO PRODUCTION IN RHODESIA.

Tobacco culture is extending in Southern Rhodesia, and the Government of the country have engaged a number of experts to give instruction to growers in the best methods of cultivating and curing the product. Turkish tobacco is the chief kind grown, since the soil and climate are reported to be well suited to the production of leaf of good quality of this variety, but bright-leaf Virginian tobacco is also under cultivation. It is stated that where farmers have followed the advice of the experts a satisfactory measure of success has already been attained.

Full details of the work done are given in the report for 1907 of the Secretary for Agriculture of the territory. So far as returns were sent in, the amount of tobacco produced in 1907 was 166,505 lb. It is known, however, that a much larger quantity than this was actually turned out, but many growers did not send in returns. Flue-curing barns for dealing with the produce have been erected to specifications furnished by the Department, and this method of curing the leaf has, on the whole, been very satisfactory. The Government are offering money prizes, which together amount to £200, for the best tobaccos produced. Among these prizes is one of £75 for the best crop of not less than 5,000 lb. of bright leaf of the Virginian type.

It is stated in the report that the uncertainty of the native labour supply at a time when it is chiefly needed is the main difficulty in the way of a very large extension of the present tobacco acreage in Southern Rhodesia.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, on September 28 last, in reference to the sales of West Indian Sea Island cotton:—

> Owing to the strike in the cotton trade, business in all kinds of cotton is more or less suspended, with the result that only 40 bales of West Indian cotton have been sold. These include some very superior St. Vincent and Barbados, at 18*d.* to 21½*d.*, and 10 bales of stains at 7*d.*
>
> Owing to lack of demand, American Sea Islands are being pressed for sale, and prices are rather lower.

COTTON IN THE SEA ISLANDS.

In their Sea Island cotton report, dated September 26 last, Messrs. Henry W. Frost & Co., of Charleston, write:—

> Although 178 bales of the new season's crop from the islands have been received during the week, none of this has yet been sampled and shown on the market. There has been some enquiry for planters' crops remaining over from last season, but at low prices. The sales were only two crop lots, which were sold for France at 32c. per lb. Freer receipts of the new crop may now be expected, and the market should open in the course of ten days from date.

COTTON GROWING IN JAMAICA.

Little has yet been done in the way of Sea Island cotton cultivation in Jamaica, although recent efforts in that direction appear more promising than those made some few years ago. The arrangement announced at the late Lancashire Cotton Conference, by which the Elder Dempster Shipping Company undertake to ship to England free of charge all cotton grown in Jamaica during the next twelve months should certainly prove of material help and encouragement to the industry in the island.

A report has lately been published of the results of a trial cultivation in cotton growing made, during the past season, on one of Lord Dudley's estates in Upper Clarendon, Jamaica. An area of 60 acres was planted with the crop, and the work was placed under the supervision of Mr. Conrad Watson, an experienced planter from Montserrat. Briefly stated, the crop consisted of 25,700 lb. of seed-cotton, yielding 7,196 lb. of lint, and 8 tons of seed. The yield of lint was at the rate of 120 lb. per acre. In spite of this, the estimated returns amounted to £391 16*s.*, while the estimated expenses amounted to £280, leaving a credit balance of £111 16*s.* In this instance the cost of management was not included. Taking into account the fact that the season was an exceptionally dry one, the return, as a whole, is not of an unsatisfactory character.

THE HORSE CULTIVATOR FOR COTTON.

The following article, which deals with the use of the horse cultivator in growing cotton, has been contributed by Mr. Thomas Thornton, A.R.C.S., late Travelling Inspector in connexion with Cotton Investigations under the Imperial Department of Agriculture:—

> Since the re-introduction of Sea Island cotton growing in the West Indies, there is no point in relation to the cultivation of the crop which has been more constantly emphasized by the Imperial Department of Agriculture than the necessity for adopting the methods of garden cultivation if success is to be attained. In this connexion two points must always be borne in mind: (1) weeds must be kept down, and (2) a good surface mulch of soil must be maintained.
>
> In a place such as Barbados, where great efforts have constantly been made to exterminate weed growth, it is not such a difficult matter to keep the fields clean; but in other islands it is a more serious undertaking.
>
> The maintenance of a good surface mulch is still more difficult. To ensure this, the surface soil has to be constantly stirred, which is both a tedious and expensive operation if carried out by hand hoeing. It is, however, an operation which no cotton planter who hopes to be successful can afford to neglect.
>
> The mechanical condition of the soil is a most important factor towards keeping the plants strong, healthy, and vigorous, so that they may produce and bring to maturity a number of bolls, and also be in a condition better to withstand the attacks of insect pests and fungus diseases. It is not sufficient to prepare the ground well before planting: the soil must also be kept in suitable condition throughout the growing period of the plant.
>
> During time of drought it is especially important that a good surface mulch is maintained. It is well known that a soil, the surface of which has been allowed to cake and harden, gives up moisture much more rapidly than when the surface layer is kept regularly pulverised; and planters in dry districts have learnt by experience that the best returns with a limited rainfall are obtained when the surface is broken up after each shower.
>
> The question of how to carry out these weeding and mulching operations in a satisfactory way and at a cheap rate, and moreover, in such a way as not to injure the spreading secondary roots of the plants cultivated, which, in many cases, are not more than 2 or 3 inches from the surface, is one which has received a good deal of attention from agriculturists. Having this object in view, implement makers have put machines of various designs on the market. Some

of these machines have teeth about 1 inch broad for entering and breaking up the soil, while others are fitted with shovels 2 to 3 inches broad, which may be substituted by sweeps 12 inches in breadth. Other implements again are fitted with spring teeth or with discs for the same purpose.

Machines of the above types are drawn by one or by two horses. The one-horse implement passes down the space between two rows, while the two-horse machine straddles the row of plants, a horse (or mule) walking on each side. It is obvious that the former implement can be used later in the growing period of the plants than the two-horse machine, being able to pass between the rows of plants when the latter have grown too tall to be straddled without injury by the two-horse machine.

The depth at which these implements work can, in most cases, be easily regulated, and many of them are made so that their width can be easily altered to suit the varying distances between the plants.

On my estate in Tobago I am at present working a one-horse cultivator known as the 'Planet Junior' (No. 9), which is proving a very useful machine. It is neat, strong in make, and can easily be drawn by a pony. The cultivator is fitted with five pointed shovels, four of which are about 2½ inches wide, while the fifth is about 4 inches in breadth. These shovels are arranged two in front and three behind. Broad sweeps can be obtained which can be substituted for the three rear shovels; and for shallow work, such as is required in cotton cultivation, these are strongly recommended.

The 'Planet Junior' machine is fitted with a wheel in front, and the depth at which the machine is required to work is regulated by raising or lowering this wheel. It is most important that the planter himself should arrange the depth at which the machine shall work. Some cultivators are fitted with a lever for altering the position of the wheel, but, in my opinion, a machine with a wheel the position of which can only be altered by taking out a bolt (as in the case of 'Planet Junior,' No. 9), is preferable.

With a good pony an area of about 4 acres per day can be cultivated by means of the machine referred to. The price of the implement is about $10·00.

In regard to the use of these mechanical cultivators at Barbados, it has been stated by planters that they might be worked with advantage on the red soils of the island, but that they would be of no use on the black soils. When the soils of the latter kind are in a sticky condition, it is possible that the machines would be of little value; but provided they were fitted with sweeps, I believe the implements would do excellent work even on the black soils, as soon as the sticky condition has passed.

RUBBER EXPORTS FROM BAHIA.

The exports of rubber from the Brazilian State of Bahia fell off considerably in 1907, as compared with the two previous years. In 1905, and again in 1906, about 1,400 tons were shipped, but in 1907 the exports fell to 1,086 tons, having a value of £219,461. As in the case of coffee, a product which also shows a diminution in the exports, the decline is attributed to general trade depression in the United States, to which country most of the rubber produced in Bahia is shipped.

The rubber of Bahia is of two kinds, known respectively as Maniçoba, the produce of a species of Manihot (but not to be confounded with Ceara rubber, from *Manihot Glaziovii*) and Mangaheira, produced from *Hancornia speciosa*. Neither of these kinds is equal to Para rubber.

TREATMENT OF LATEX IN THE PREPARATION OF RUBBER.

The causes of discoloration in rubber, and a suitable method of preventing this, so that the finished product can be put on the market, uniform in appearance and character, are dealt with by Mr. Kelway Bamber, F.I.C., in the following article, which appeared in the *Bulletin* of the Straits and Federated Malay States of August last:—

A point of considerable importance in the manufacture of plantation rubber is to obtain not only purity, but constant uniformity in the finished product. At present there are almost daily variations in appearance, due to causes which cannot easily be overcome, such as weather, age of the trees tapped, and the bringing of new trees into bearing, all of which affect the colour and clearness of the dried rubber. The discoloration is due to oxidation of soluble organic bodies in the latex water. This oxidation is produced by the action of an enzyme or chemical agent causing fermentation, and the process is intensified by a warm temperature and exposure to the air.

Thorough washing of the freshly coagulated caoutchouc will remove much of the soluble matter and also the enzyme, but it is difficult or impossible to remove it all, and other means have to be adopted to prevent the darkening on drying which almost invariably occurs. This is done by destroying the enzyme by means of heat before oxidation occurs, with the result that rubber dries of a clear pale yellow colour, and of perfect uniformity from day to day.

The heating can be done in either of the following ways before or after coagulation:—

1. By passing steam into the bulked latex until the temperature reaches 80° C. or 167° F., and maintaining this temperature for fifteen minutes or longer, according to the thickness of the rubber.

2. By immersing the biscuits or sheets, etc., in water of the temperature mentioned for some minutes immediately after passing through the rolling machine; the rubber should then be re-rolled to the requisite thinness, and immersed again for a shorter time to ensure destruction of the enzyme.

3. Hot water can be employed in the washing machine, and if necessary steam-heated rollers as well.

Heating during the process of coagulation most nearly resembles the method of making hard Para, but the other methods give excellent results.

To insure the best product, cleanliness in all stages of collecting and manufacture is essential, and if the loss in value from want of simple precautions in the preparation was more fully realized on rubber estates, much greater care would be exercised. Many samples of excellent rubber appear on the London market, but from want of uniformity, and perhaps the presence of some slight impurity, the price realized is lower than it would otherwise be.

Rubber made by this process has already been sold on the market, and the price realized was about 4*d.* per lb. over that commanded by ordinary good biscuits, which indicates that the process can be successfully applied on the estate. It still remains to be proved whether the rubber is stronger than that manufactured by the ordinary method, and Messrs. Gow, Wilson, & Stanton, Ltd., rubber brokers of London, are now having the product tested by manufacturers to determine this point. As the process resembles in some points the manufacture of fine hard Para, there is reason to expect some improvement in the physical properties in addition to the other advantages obtained.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

VOL. VII. SATURDAY, OCTOBER 17, 1908. No. 169.

NOTES AND COMMENTS.

Contents of Present Issue.

Attention is drawn in the editorial to one or two points of especial interest among those dealt with at the late Lancashire Cotton Conference.

Sugar-cane seedlings D. 130 and B. 306 have for some years been under cultivation in Mauritius, and from the returns recorded at the Experiment Station, it is evident that the Demerara seedling is best suited to the conditions prevailing in the colony. The sugar industry of Formosa is undergoing considerable development (pp. 322-3).

The methods followed in the cultivation, manuring, etc., of pine-apples in Florida are described on page 324.

On the following page will be found a brief report on the progress made during the past year in the various agricultural industries of Dutch Guiana.

Under 'Cotton Notes' (page 326) there appears an interesting article dealing with the use of the horse cultivator in connexion with cotton growing. A machine of the type described has proved very useful on a cotton estate at Tobago.

A further portion of Mr. Ballou's article dealing with the Order of insects known as the Diptera is given on page 330.

The methods which are in use for obtaining new varieties of Agricultural plants are described under 'Science Notes' (page 331).

Bermuda Arrowroot.

Reference is made in the *Annual Report* (1907) on the Bermudas, to the fact that the arrowroot produced in the colony, though falling off in quantity of late years, still continues to hold its premier position on the market. One arrowroot factory exists at Bermuda. This is equipped with modern plant, and is capable of dealing with a large quantity of the commodity. It is stated that the cultivation and manufacture of arrowroot could be increased, and that this would add materially to the agricultural prosperity of the islands. The retail price on the London market of the Bermuda product is about 2*s.* 6*d.* per lb. as compared with 1*s.* 9*d.* per lb. for St. Vincent and other arrowroots.

School Shows at Trinidad.

Five School Horticultural Shows were held at different centres in Trinidad during 1907-8. At each of the shows there is a section for produce from peasant holdings, in addition to that for exhibits from school gardens.

The produce sent in to the shows of the past year, although less in quantity, is described as having been distinctly better in quality than in past years. This especially applies to the section for peasant proprietors. The Inspector of Schools at Trinidad, in his latest report mentions that one of the best results of the establishment of these annual shows has been the awakening of the small holders of land to the possibilities of vegetable culture on a market scale on their holdings. The increased production of green vegetables would not only add to the material prosperity of the peasantry, but also supply a real need in most of the West Indian Islands, where the supply of green vegetables is never too great. It is evident that school garden work at Trinidad is having useful and practical results.

Quinine as a Preventive against Malaria.

With the co-operation of the Governor of Uganda, returns have lately been collected from Europeans resident in that Protectorate, with the object, if possible, of obtaining definite information as to the best time and manner in which quinine should be taken as a preventive against malarial fever.

The trials extended over a period of twelve months, and 217 persons sent in regular reports. The returns were collated at the end of the year, and a summary of the results is given in the Uganda *Official Gazette* of August 1 last. The lowest precentage of fever, viz., 31·3, was experienced among persons taking quinine in daily doses of 5 grains. Where 10 grains were taken twice a week, the percentage of fever cases was 65·8, but fell to 50 per cent. with people taking 15 grains of the drug every eighth or ninth day. Again the proportion of fever cases was 46·5 per cent. when quinine was taken irregularly. These results are not so valuable as might be the case if the conditions were more fully controlled, since the numbers of people following the different systems were not equal. It is probable, however, that the system of taking small daily doses of quinine is the best under such conditions.

Gale at St. Kitt's-Nevis.

Mr. F. R. Shepherd, Agricultural Superintendent of St. Kitt's-Nevis, reporting on the gale which passed over that Presidency on September 25 last, states that little destruction was done at St. Kitt's, apart from the defoliation of young cotton in certain parts, as the result of the high wind. A few limbs were broken from trees at the Botanic Station. The rainfall was about an inch all over the island.

At Nevis cotton suffered from the gale to a greater extent than at St. Kitt's, more especially in the south and east of the island. The Agricultural Instructor of Nevis reports that the cotton plants were badly defoliated, and appeared as if a fire had passed through them. In some places the plants are not expected to recover from the effects of the gale unless suitable rains soon occur. Only 80 parts of rain were registered at Nevis during the gale.

◆

Hand Cultivators.

The hand cultivators referred to in the *Agricultural News* of September 5 last (page 284), and which it was thought might prove useful in connexion with cotton cultivation in these islands, have been tried, with satisfactory results, at the Agricultural School, St. Vincent. The Acting Agricultural Superintendent, in a letter dealing with the subject, mentions that the tools are lighter in use, and more suitable for employment by boys and women than the ordinary grubbing-hoe so largely used in the West Indies. If the soil has been properly cultivated in the first instance, a man, working with one of the hand cultivators, should have no difficulty in loosening the surface soil over an area of 2 acres every day. Apart from their use in this way, it is pointed out that these tools might with advantage be utilized in dragging from the soil the roots of such plants as 'Devil's grass' (*Cynodon dactylon*), after the land has been broken up with forks.

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Forage Crops For Hogs.

Farmers' Bulletin 331 of the United States Department of Agriculture deals with the value of various forage crops in feeding and fattening hogs. Among the crops discussed from this point of view, and which are well known in the West Indies, are cowpeas, sorghum, and ground nuts. Ground nuts, as might be expected, have proved of special value for young and growing pigs, although they should be given only in combination with some more starchy food, as maize.

In one feeding trial carried out at the Alabama Agricultural Experiment Station, three lots of pigs were fed respectively upon ground nuts (including vines), sorghum, and sweet potatos (including vines). In addition each lot was given a certain amount of maize, which was equal in all three cases. While 1 lb. of gain was made by the pigs fed upon ground nuts for each 1·77 lb. of maize consumed, it took 3·13 lb. of maize in the case of the animals feeding on sweet potatos, and 3·7 lb. of maize when sorghum was given, to produce a pound of gain.

Agricultural Exports of British Honduras.

Lumbering is at present by far the most valuable industry of British Honduras, mahogany, logwood, and cedar being the chief woods grown. The diminished timber exports, however, indicate that activities were considerably lessened in this industry during 1907. Mahogany shipments fell from 7,788,249 feet in 1906 to 6,871,920 feet in 1907: logwood from 8,773 tons to 6,167 tons, and cedar from 448,651 feet to 331,636 feet during the same period. Owing to the long drought, the waterways had so dried up that many wood-cutters were unable to float their timber to the port of shipment, and this in part accounts for the lessened output.

To the want of rain is also attributed the decreased banana exports, which fell from 725,000 bunches in 1906 to 652,930 bunches in 1907. Plantain shipments show a similar decline. The cocoa-nuts exported in 1906 numbered 5,527,985, but in the following year the shipments were only 4,550,175.

On the other hand, more or less small increases were made in the output of cacao, rubber, sugar and rum, while the exports of chicle show a large advance. The cacao shipments were 42,800 lb. in 1906, and 46,435 lb. in 1907. Rubber exports advanced from 20,244 lb. to 24,112 lb., and sugar from 88,441 lb. to 93,360 lb.

◆

Rice Crop of the United States.

An official report on the rice industry of the United States for the year ending August 31 last has lately been issued.

The total rice crop produced in the States (Texas, Louisiana, Carolinas) is estimated at 4,250,000 bags, exclusive of about 750,000 bags lost in the fields through continuous rains. As a result of this loss, there was a shortage on the market, and the amount of rice in stock at the end of the year 1907-8 was lower than in any previous year on record. Prices were good throughout the season, and the average price for the twelve months was the highest on record for the past six years.

While the output of rice in the States was somewhat lower than in the previous year, there has been a notable advance in the demand for the product, and the consumption of this food is evidently much on the increase in America. It is believed that a crop of 5,000,000 bags of rice would not be too great to supply the present annual demand in the United States, so that at this rate the consumption exceeds the home production. This is the more satisfactory to the American rice grower, because—apart from Porto Rico—there is little or no outside market open to him in which his product has any chance of competing with East Indian rice.

In 1907-8, Porto Rico imported 763,675 bags of rice (each of 168 lb.) from the United States, as compared with 935,850 bags imported in 1906-7. Great Britain is the customer of second importance, but she took no more than 3,124 bags in 1907-8.

Rice-bran and polish were exported from the country to the amount of 20,672,376 lb. during 1907-8,

INSECT NOTES.

Diptera.

(Continued from last issue of the *Agricultural News.*)

The midges or gall gnats are included in the Cecidomyiidae, another family of Diptera with long antennae. These are very small, frail insects, not often seen, but a few species are pests of considerable importance. The most important species of the Cecidomyiidae is the Hessian fly which attacks wheat and other cereals in America and Europe. The loss to the farmers of the United States from the ravages of this insect has been estimated as high as $10,000,000 annually.

In the West Indies this family is represented by the red maggot of the cotton (*Porrichondyla gossypii*), and the flower-bud maggot of cotton (*Contarinia gossypii*). Maggots of a fly also belonging to this order have recently been found living under the bark of the twigs of grafted mango trees, and there are probably many others at present not known.

In the larval stage, the red maggot lives under the bark of the cotton plant, the reddish colour of the maggot suggesting the common name. The egg of the fly is probably usually laid in some break or abrasion in the bark, but it seems likely that the insects are able to enter the plant even when there is no break in the bark.

The egg of the flower-bud maggot of the cotton is laid in the very young flower-buds, which drop to the ground as the larvae within become full-grown. Very soon after the buds drop, the larvae leave them, and the pupa stage is passed in the ground. This insect is found in Antigua, where it caused much damage to the cotton during the past season.

Another family of the true flies with long antennae are the Chironomidae. The best-known members of this family in the West Indies are the sand-flies (*Ceratopogon*). The larvae of most species of the family are aquatic. Some of them live in the mud and decaying vegetable matter at the bottom of ponds or lakes; the larvae of others, especially of the sand-flies, live under the bark of decaying branches, under fallen leaves, and in sap flowing from wounded trees.

The family Psychodidae include a small number of delicate flies known as moth flies. This common name has been derived from the moth-like appearance due to the broad hairy wings of the adult insect. They are not rare in the West Indies, but are seldom seen on account of their small size. The larvae live in running water, such as drains and roadside gutters.

The largest family of the flies with long antennae is the Tipulidae, and this includes some of the largest of all the flies. These insects have remarkably long legs, slender bodies and narrow wings. They are commonly known as 'crane-flies' and 'daddy-long-legs. The larvae live in the ground where there is plenty of moisture, and feed upon decaying vegetable matter, and the roots and leaves of plants. They sometimes are numerous enough to be pests of considerable importance, and in England they are known as 'leather-jackets.'

The flies with short antennae include many species, which from their size or habits are more frequently observed than most of those already referred to. The family Tabanidae includes a large number of species of so-called horse-flies, gad-flies and others. They are fairly large insects with thick bodies, and many of them are capable of inflicting painful bites. The adult females, which are blood-sucking in their habit, attack man and beast, while the males feed upon the nectar of flowers.

The Bot flies (*Oestridae*) are better known from their attacks on domestic animals, in the larval condition, than from the appearance of the adult fly. The horse-bot (*Gastrophilus equi*) infests the stomach and intestines of horses. The female fly attaches the eggs to the hair on the shoulders or legs or belly of the horse. They are licked off by the horse, and swallowed, and when they hatch in the stomach or mouth of the horse the larvae attach themselves to the lining of the stomach.

When a large number of bot larvae are attached in this way to the stomach lining, serious injury is done to the animal. When the larvae become full-grown they release their hold and are carried out with the excrement to the ground, where they pupate.

The larvae of the bot flies of cattle (*Hypoderma bovis*) are found in small tumours under the skin. They differ from the horse-bot in that upon the hatching of the eggs which have been swallowed by the host animal, the larvae burrow through the tissues of the body, and finally come to rest just under the skin along the back. When a maggot becomes full-grown, it gnaws through the skin and falls to the ground to pupate.

The hides of cattle which have been badly attacked by bot flies are almost valueless on account of the punctures made by the escaping maggots. The amount of loss from this cause in the United States has been estimated to be as much as $50,000,000 annually.

Another species of this group attacks sheep, the larvae living in the nasal passages, and sometimes penetrating to the brain, thus causing the death of the sheep. Other species of this family are recorded as attacking man in tropical America, the larva being found under the skin of the patient.

The family Syrphidae or flower-flies is one of the largest of the families of Diptera, about 2,500 species being known. Many of the flower-flies resemble bees and wasps in appearance, and they feed on the nectar and pollen of flowers. The larvae vary greatly in their habitat and feeding habits, but a few are to be found on leaves of plants, and they prey on plant lice and scale insects.

The so-called 'rat-tail maggots' are the larvae of flies of this family. They live in stagnant water or slime and are peculiar in having the hinder end of the body elongated like a slender tail. This projection serves as a breathing tube and projects upward to the air while the body of the insect remains in the water. The air is taken in through an aperture at the tip of the tail.

(*To be concluded in the next issue.*)

Destructive Insects in Ceylon. Among the chief points dealt with in the report for 1907-8 of the Government Entomologist of Ceylon are the rapid increase in numbers of the Red Palm weevil (*Rhyncophorus signaticollis*), which occurred after the destruction of cocoa-nut groves in certain parts by a cyclone, and the threatened increase of the Rhinoceros beetle (*Oryctes rhinocerus*) which also attacks the cocoa-nut, and though possibly doing little direct damage, facilitates the entrance of the red weevil.

SCIENCE NOTES.

The Improvement of Agricultural Plants.

An account of the methods which are in use for obtaining new varieties of agricultural plants is given in an article by M. Schribaux, published in the *Bulletin de la Société d' Encouragement pour l' Industrie nationale* for May last. These methods fall into three groups—(1) careful watch is kept for sports, i.e., plants which. for no obvious reason, differ from the others: (2) variation is induced by altering the conditions of growth: (3) suitable plants are 'crossed.'

The following summary of the above-mentioned paper, together with references to other papers bearing on the same subject, and published elsewhere, appeared in *Nature* of September 3 last:—

The first method mentioned by which new varieties are obtained is necessarily haphazard, since sports can obviously not be predicted; it has, however, proved very useful in the past, and has yielded many valuable varieties of potatos, of fruit trees, etc. The second method promises very interesting results, for some plants respond quickly to changes in their surroundings. M. Schribaux sowed in a garden soil the seeds of the wild carrot, an annual with a woody root. In two generations a certain number had become biennials, with a fleshy root like the cultivated carrot. M. Blaringhem adopted quite a different method with maize. Plants were cut down just as the ear was beginning to develop, i.e., at the time of maximum vital activity; 76 per cent. of those surviving developed abnormally. Some were permanently altered; thus a late Pennsylvania maize was converted into an early variety.

Another instance of great practical importance is furnished by the grape vine. After struggling long and vainly against the ravages of Phylloxera, the French vine-growers have made up their minds to live with it. M Viala visited America and brought back some vines which had become so differentiated from those growing in France that they withstood the attacks of the pest. Unfortunately, they would not grow on calcareous soils, but became very chlorotic, and further search was made. Vines were in the end discovered capable of withstanding Phylloxera and of growing on calcareous soils; these have solved the problem for the French grower. Perhaps the case of the sugar-beet is most interesting. The grower requires roots containing a large percentage of sugar, a low proportion of the accompanying salts, and capable of resisting adverse conditions.

The selection is made, in the first instance, on the basis of the sugar content. A large number of roots can be rejected by simple inspection, for high sugar content is correlated with certain external features; the other roots are examined chemically, since it is found that removal of a portion for this purpose does not interfere with subsequent growth. The very best are then cut up into a number of pieces to be grafted into other roots: they produce seed, which is sown, and yields roots for further selection. M. Schribaux states that a single root has yielded sixty-four pieces, each capable of producing seed. It is not surprising that the percentage of sugar has gone up from 11 per cent. in 1870 to 16 or 18 per cent. to-day.

There is evidence, however, that the process will not go on indefinitely, for roots containing more than 18 per cent. of sugar cease to vegetate properly. Sir W. T. Thiselton-Dyer discusses this aspect of the question in the *Journal* of the Board of Agriculture for April, taking the potato as an illustration. Like the sugar-beet, the potato has been the subject of continual selection, and the end result is a highly artificial tuber of great commercial value but difficult of cultivation. The practical man speaks of degeneration, but Thiselton-Dyer does not consider this to be the case. He points out that the potato has been induced to load itself with starch far in excess of any natural requirement of the plant, and suggests that too much is being demanded of the plant, and the machinery for the processes of growth has reached its breaking point.

'We can control nature in altering the constitution of a plant; but eventually a barrier is reached beyond which it is impossible to go.'

It is often found difficult to fix the new varieties obtained by selection. Even when asexual reproduction is possible, as in the case of trees and potatos, the variation frequently does not remain permanent, and many promising varieties have disappeared. When reproduction is by seed it is still more difficult to fix a variety; this is abundantly proved by the difficulty of improving wheat. A single ear is selected because it possesses some desirable property; the seed from it is sown; an ear is selected showing the same property, and the process is continued for several generations. 'Pedigree' seed is thus obtained, but it rarely remains true; the farmer has to renew his stock periodically from the raiser who keeps on the selection process. The work done on the selection of seed wheats at the Roseworthy Agricultural College is described in the *Journal of Agriculture* for South Australia; it is hoped in this way to obtain strains which will keep their character for two or three seasons and prove much more profitable than the seed wheat now in use. There is no question that a good deal can be done by selection, especially in South Australia where, we are told, little or no attention has been given to the matter, and the best grain is sometimes sold and the worst kept for seed. But it is now clear that the only safe method for the improvement of crops grown from seed is to breed on Mendelian lines, as Professor R. H. Biffen is doing at Cambridge, and South Australia would do well to breed, as well as to select, seed wheat.

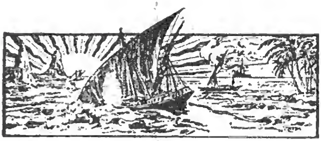
CACAO PRODUCTION IN BRAZIL.

About one-fourth of the world's supply of cacao is now produced in Brazil, and of the total output from the country, the State of Bahia produces about 80 per cent.

In 1907, the export of cacao from Bahia was equal to 21,221 tons, or 1,743 tons less than in 1906. In the British *Consular Report* on the trade of Bahia for the past year, it is mentioned that the 1907-8 crop totals over 22,000 tons, thus showing an advance of about 1,000 tons on the returns of 1907.

As in other cacao-producing countries, the market price of cacao at Bahia underwent considerable variation in 1907. While in the previous year, Bahia cacao of 'fair' quality had stood constant at about £2 6*s*. per bag of 132 ℔., the price rose as high as £5 11*s*. 6*d*. at one time in 1907. A considerable falling off in the demand was the result of this high figure.

When the financial crisis of last year occurred in the United States it had the effect of diminishing the price of cacao, which fell to £3 6*s*. per bag of 132 ℔. At present the price of Bahia cacao of 'fair' quality stands at £3 15*s*. to £4 per bag, but the demand for the product is still much less than that which formerly existed.



GLEANINGS.

Eight grants of Crown lands, comprising in all 334¼ acres, were made in British Honduras during 1907. The price paid varied from $1·00 to $2·50 per acre, according to the locality of the land.

The fortnightly rice report of Messrs. Sandbach, Parker & Co., of British Guiana, dated October 2, states that weather conditions during the preceding fortnight had been dry and favourable. The rice crop was being reaped in several districts, and harvesting operations would soon be general throughout the colony.

There are about 75,000 acres under coffee in Costa Rica, and this area remains stationary from year to year. The average production of dry coffee per acre is from 5 to 6 cwt. The total export during 1907 was 17,325 tons, of the value of £683,975.

Increasing attention is being paid to the cultivation of cacao in the Sao Paulo State of Brazil. The crop thrives in many parts of the State, and the Government are offering a bounty of £70 for every 2,500 trees planted. (British *Consular Report.*)

The lately issued statistical report of Messrs. Hecht, Levis and Kahn, rubber brokers, shows that during the year 1907-8, the rubber exports from Para to Europe reached 21,780 tons, while 14,690 tons were shipped to the United States. In 1906-7, Europe received 19,325 tons and the United States 18,316 tons from Para.

Rice is extensively grown in Peru, the annual output being about 30,000 tons. The grain of best quality is produced in the Departments of Lambayeque and La Libertad. There are some twenty rice mills in the country, of which the largest and most important are said to be equipped with up-to-date machinery.

The *Gardeners' Chronicle*, in a note on the progress of cold storage methods of fruit preservation, instances a case in which a collection of dessert pears, gathered seven months previously, was exhibited in perfect condition at Lyons. The fruits had not undergone the least degree of shrivelling, they bore transit well, and the flavour was good.

In reference to the article dealing with rice cultivation in Hawaii, which appeared in the *Agricultural News* of August 8 last (page 245), Mr. F. G. Krauss, the expert in charge of rice-growing investigations at Honolulu, writes to point out that the total rice area of the Hawaiian Islands is 10,000 acres, instead of 1,000 acres, as originally stated in the *Agricultural News.*

Reports from St. Croix state that the Sea Island cotton crop has suffered severely from the drought of August and September. In many cases the flowers and young bolls have been dropping off in considerable quantity.

The latest annual British *Consular Report* on Dutch Guiana states that the number of small settlers in the colony is increasing. At present, over 21,000 acres are held from the Government and from private individuals by immigrants from the British East Indies. During 1907, indentured immigrants to the number of 2,924 entered the colony; rather more than half of these came from British India and the remainder from the Dutch East Indies.

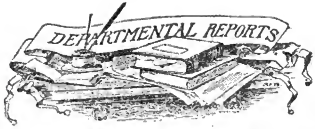
The total production of cane sugar in British India for the year ended March 31, 1907, was 2,076,250 tons. In addition to this amount, however, a total quantity of 486,535 tons, valued at $27,276,092, was imported. The greater portion (296,344 tons) of the imports consisted of cane sugar, while the remainder (190,192 tons) was beet sugar, imported chiefly from Austria-Hungary and Germany. (U. S. *Consular Reports.*)

Mr. Robert Newstead, Lecturer on Economic Entomology and Parasitology at the Liverpool School of Tropical Medicine, has arranged to pay a visit to Jamaica from the first week of November onwards, for the purpose of investigating the ticks there which are responsible for certain diseases in animals, and also the disease-bearing insects of the island. He may be accompanied by a medical research investigator, whose duties would be to study the indigenous diseases of Jamaica. (*Science.*)

A note in a recent issue of the *West India Committee Circular* mentions that an area of about 50,000 acres has lately been taken up in Natal, which will in large part be cultivated with sugar-cane. A central factory has already been erected capable of turning out 7,000 tons of sugar per annum, and the proprietors of the factory will purchase canes from the cultivators at rates varying with the market price of sugar. As the cane-growing area increases, another factory will, if necessary, be erected.

Owing to the long drought experienced at Barbados, planters in some districts have been forced to dig up canes planted last November and December, since their condition was so backward that but little return could be expected at the coming reaping season. Late planted cotton may possibly be successfully grown in place of these canes, if favourable rains soon arrive, but in most cases provision crops will probably be planted. In a few cases the land will be replanted with cane next month or in December.

One or two notable agricultural developments which took place in 1907 are reported from the Transvaal and Orange River Colonies. A fairly large amount of maize was exported during the year. Cotton has been successfully cultivated, and a first export, amounting to 2½ tons of cotton and 6 tons of seed was made. Tobacco growing has made rapid progress in the Magaliesberg district, and a large factory, costing £15,000, has been erected. Several companies have started the preparation of higher grade tobaccos. It is also mentioned that trial shipments of oranges were made to Europe during the year, and the fruit met with a ready market.



ST. VINCENT: ANNUAL REPORT ON BOTANIC STATION, AGRICULTURAL SCHOOL, LAND SETTLEMENT SCHEME, AND OF GOVERNMENT VETERINARY SURGEON, 1907-8.

The total expenditure in connexion with the St. Vincent Botanic Station during 1907-8 was £530 14*s.* 5*d.*, there being a decline of £40 17*s.* 7*d.* as compared with the expenditure of the previous year. The receipts were £24 10*s.* 3*d.*, showing a slight increase on those of 1906-7.

One result of the increasing amount of attention given to the cultivation of Sea Island cotton in the island during the past two years has been a great falling off in the demand for economic plants from the Botanic Station. In 1906-7 the number of economic plants distributed was 10,143, including 6,465 cacao trees. During the year under review 5,148 economic plants were sent out, of which 4,520 were cacao.

The cacao industry of St. Vincent is evidently making excellent progress, and the cultivations would appear to have nearly recovered from the effects of the hurricane of 1898. In 1905-6 the cacao exports were 137,673 lb. They advanced to 193,073 lb. in 1906-7, and to 216,380 lb. in 1907-8.

The area under cultivation with Sea Island cotton has now reached 3,200 acres (an increase of 100 per cent. over the cotton area of 1906-7). This is believed to represent the limit to which cotton can be profitably cultivated in the island. The weight of lint exported during 1907-8 was 388,833 lb., this representing an average return of 135 lb. per acre. In 1906-7 the average yield of lint was equal to 175 lb. per acre, and the falling off was due partly to bad weather, and attacks from insect pests; but in many cases, bad management of the crop also contributed to the decline.

In regard to the Agricultural School and Stock Farm, the total expenditure for the year 1907-8 amounted to £614 1*s.* 11*d.*, while a sum of £42 0*s.* 10*d.* was derived from the services of animals and the sale of seeds and plants.

There are now twenty-three boys at the school. The health of the pupils has been good throughout the year, and the report of the examiner states that the discipline of the school is very satisfactory.

The indoor work of the pupils includes instruction in general school subjects, as well as in Elementary Science—Chemistry and Botany. Careful training in field work, including the best methods of cultivation, uses of artificial manures, grafting, budding, etc., is also regularly carried on.

During the past year an African woolless ram sheep, obtained from Lagos by the Imperial Commissioner of Agriculture, was added to the Stock Farm.

The report on the Land Settlement Scheme speaks of satisfactory progress on all the estates. Cacao is the chief crop grown, and considerable advance has been made in the provision of wind-breaks for the protection of the cultivations.

The report of the Government Veterinary Surgeon includes a number of tables showing the mortality of stock in St. Vincent. While the number of deaths due to anthrax during the first three months of 1907 was 217, it was but 87 during the corresponding period of 1908.

TRINIDAD: ANNUAL REPORT ON GOVERNMENT STOCK FARM, 1907-8. By C. W. Meaden, Manager.

The financial statement on the working of the farm for the year under review compares favourably with the statement of last year. The expenditure in 1907-8 has been £3,413 2*s.* 9½*d.*—a decrease of £128 1*s.* 11*d.* compared with that of 1906-7, while the revenue for the past year—£2,955 19*s.* 7*d.*—shows an increase of £625 15*s.* 9½*d.* over that of 1906-7. The apparent excess of expenditure over revenue is explained by the fact that, as in past years, milk was supplied free to various medical institutions in the island, while a supply was also regularly given to calves at the Farm. An expenditure was also made in improving the value of the property during the year.

The animals kept at the farm comprise oxen and cows of various breeds, horses, pigs, and poultry. The general health of the stock was good throughout the year, apart from the fact that an attack of strongyls caused the death of nineteen yearling cattle.

The number of calves born during the year was 133. Of these 10 were pure Zebus, 93 by pure Zebu bulls, and 30 by a Red Poll bull. Calves from the Red Poll bull crossed with Zebus or with local cattle are said to be satisfactory and good general-purpose animals. A well-bred Shorthorn bull, of good milking strain, was purchased for the Farm in November last. The Zebu herd of cattle is in good condition. The result of crossing the Zebu with cows of the Guernsey breed is said to be very satisfactory.

The pigs kept at the Farm are of the Berkshire, Tamworth, and Poland-China breeds. All are good types, and the last-named are especially well spoken of as a suitable breed for small cultivators.

Poultry of the Buff Orpington, Plymouth Rocks, White Leghorns, White Wyandottes Black Minorcas, and Rhode Island Reds are also kept.

At the annual sale of stock held in February 1907, a sum of £601 4*s.* was realized. The stock sold included a large number of pure and cross bred cattle, together with mules, pigs, poultry and ducks

STOCK-KEEPING AT ST. VINCENT.

Efforts have continuously been made by the Imperial Department of Agriculture to improve the various kinds of live stock kept at St. Vincent by the importation and maintenance of animals of superior type. The services of male animals brought into the island in this way have been available to stock owners at a very small cost.

The Master-in-charge of St Vincent Agricultural School, however, in his *Annual Report* for 1907-8, points out that a good deal of advance must yet be made by agriculturists in St. Vincent, before they become practical and efficient stock-keepers. Among the points which many have yet to realize are the necessity of providing adequate fodder beforehand for consumption during the early dry months of the year, the need for improvement of existing pastures, which in numbers of cases consist largely of weeds; that if animals are to raise calves and yield milk, the provision of good fodder, mash, and salt is essential; that since cattle may be divided into (*a*) working, (*b*) milking, and (*c*) beef animals, it is useless to expect a first-class milking animal to have the other two characteristics; and finally, the importance of breeding only from the best animals.

PACKING OF NON-DRYABLE SEEDS.

The question of the best method of packing seeds, in small quantities or in bulk, for shipment to a distance, is one that demands careful consideration if successful germination is to be expected. This is especially the case with seeds which will not stand drying without rapid loss of vitality. Among these latter may be mentioned the seeds of Para and Castilloa rubber. Parcels of rubber seeds (chiefly Para, from Ceylon and the Malay States) are frequently sent to the West Indies and other countries, and reports of a most varied nature are received as to the results obtained on planting. Provided the seeds are young, in good condition, and have been properly fumigated, and the package is securely put up, successful germination of the contents depends on the character of the packing material (which should be sterilized beforehand), on the temperature through which the seeds have to pass in transit, and on the time occupied in shipment. The following notes on the subject are taken from the *Bulletin* of the Trinidad Botanical Department, July 1908 :—

> Packing material should be well sterilized as it may contain the spores of moulds or other destructive fungi, which will destroy the seed in transit The coat of the seed should also be sterilized by suitable agents such as formalin solution or formalin vapour.
>
> The character of the packing material used is important. It should not be of a caustic nature, like freshly burned or unweathered charcoal. It should be of light weight, and specially calculated to hold no more moisture than is retained by the seed itself. If it holds more, some of it will be absorbed by the seed : if it holds less, it will take away moisture from the seed. If new charcoal is used and the seeds start to grow, the radicle will be destroyed by the creosote of the material, whether this is powdered or not. Again, the material should not be such as will produce ammoniacal gases, or develop fermentation. In regard to moisture conditions, what is to be aimed at is to have the packing material in such a state that it will not add to, or take away from, the moisture which the seeds contain.
>
> The temperatures in countries or in oceans through which the seeds are to pass, must be studied. *Non*-dryable seeds suffer greatly if they have to pass through low temperatures. Nutmegs, for instance, packed in damp earth will probably rot, if chilled by the low temperatures of a European spring, while packed under exactly similar conditions, they will go quite safely if sent in the summer months. Tropical seeds, if they have to pass through temperatures below 40° F. will seldom arrive in good condition, although they may at times get through with safety. Seeds which permit of being dried will of course stand cold with indifference. The object should be to send if possible all seeds so as to meet no lower temperatures than 60° F. to 70° F.
>
> The length of the journey and the time taken in transit have great influence on the condition of seeds. If long, it is better to pack them with a view to slow germination on the voyage, rather than to keep them so dry as to prevent germination. Seeds packed with an abundance of moisture will go safely for short distances, but would perish on long journeys if packed in the same manner.
>
> The package should be secure so as not to allow it to obtain moisture from the air, or to be deprived of moisture by surrounding dry air, and it should not allow of the access of insects, or spores of fungi. It will be found better to pack in small well-sealed packages, and afterwards to pack these in cases through which air should freely circulate. The danger incurred in packing large boxes of seeds without division is due to possible fermentation in hot weather, and to possible rotting in cold weather.

In reference to the packing of Para rubber seeds, the latest report of the Botanic Gardens, British Guiana, mentions that seeds dispatched from Singapore to British Guiana, by parcel post, and packed in burnt rice dust, showed a very satisfactory percentage of germination, while seeds which were enclosed in kerosene tins, and sent as ordinary merchandise and shipped in the hold of the vessel, produced only eighteen plants from 10,500 seeds.

BERMUDA.

Improvement of Agriculture.

The accompanying extract from the speech of Lt. General J. H. Wodehouse, C.B., C.M.G., Governor, in opening the Colonial Parliament of Bermuda, is useful, as showing that it is recognized that more skilful methods of cultivation, and wide scientific knowledge are essential at the present time to the profitable cultivation of crops on which the welfare of these colonies depend. General Wodehouse said :—

> It is with regret that I look back upon an unfavourable situation as regards certain branches of Agriculture in the colony during the present year.
>
> Increased competition in foreign markets, unscientific methods of cultivation, and, possibly in some measure also an insufficient appreciation of the advantages of co-operation and of advertisement abroad by direct representatives of local industries, constitute, in my opinion, some of the preventible causes to which the unremunerative results of the past season must be ascribed.
>
> The maintenance of a sound system of cultivation is a matter of vital importance to the prosperity of these islands, and I have accordingly appointed an Agricultural Commission to enquire and report as to the remedial measures which are undoubtedly required under present circumstances.
>
> I am confident that by the exercise of patience, the application of scientific methods, and the elimination of those varieties of products whose profitable cultivation has been shown by experience to be impracticable for commercial reasons, or undesirable on scientific grounds, it will most assuredly be possible to re-establish this indispensable industry on a sound and remunerative basis.
>
> At the same time, however, I desire to impress upon you that any remedy necessarily proves inefficient in the hands of individuals whose education is not such as will enable them to realize its necessity or appreciate its results.
>
> I would accordingly invite your Honourable Houses to consider to what extent the present agricultural depression may be due to the lack of opportunities on the part of the rural population for acquiring the scientific knowledge which under modern conditions is essential to the profitable cultivation of vegetable produce. The future of these Islands depends, in my opinion, upon the improvement of education, of agricultural methods, and of communication with other countries.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of August:—

The report on spices and drugs for the month of August is always more or less dull and uninteresting, as it is not only the chief month of the whole year for holiday making, but the inclusion of the bank holiday imparts to it a general absence of business in every branch of commerce, affecting not only the one statutory day, but several days after.

The following are the chief notes on West Indian produce:—

GINGER.

At the first spice sale on the 12th, a large quantity of Jamaica was offered but only comparatively small dealings were effected at 60*s.* Cochin and Callicut were brought forward in moderate quantities and bought in at 85*s.* to 87*s.* 6*d.* for bold cut selected, 55*s.* for small and medium, and 36*s.* for small washed Cochin. Fair limed Japan realized 28*s.* per cwt. At the last sale, a fortnight later, only a moderate supply of all kinds was brought forward and small sales were effected at similar rates to those already quoted.

NUTMEGS, MACE AND PIMENTO.

For nutmegs there has been little or no demand with no change from former prices. Mace at the first spice sale was represented by 53 packages of West Indian, which were disposed of at the following rates: Fair to good pale, 1*s.* 4*d.* to 1*s.* 6*d.*; and fair pale and reddish, 1*s.* 2*d.* to 1*s.* 3*d.* Good pickings fetched 1*s.* 1*d.*, and broken 10*d.* to 11½*d.* per lb. A week later 13 barrels of West Indian were sold at similar rates, and 14 cases of Penang were bought in at 1*s.* 10*d.* per lb. Of pimento, at the first sale on the 12th, 203 bags were offered, only a part of which sold at 2*d.* per lb. At the close of the month from 2*d.* to 2⅛*d.* was the price realized for fair quality.

ARROWROOT.

At the spice auction on the 26th, 330 barrels of St. Vincent were offered and only 22 sold, realizing 2¾*d.* per lb. for good manufacturing. In connexion with the British trade in arrowroot, some extracts have recently appeared in the English press from an official report on the trade of Bermuda for 1907, where attention is drawn to the high price of the Bermuda product, in comparison with that of St. Vincent, the former fetching in the retail market 2*s.* 6*d.* per lb., against 1*s.* 9*d.* per lb. for St. Vincent. It is also pointed out that the exports to the United Kingdom during the year quoted were valued at only £470 against £1,194 in 1906.

SARSAPARILLA.

At the drug auction on the 12th, 19 bales of native Jamaica were offered, and 16 sold at the following prices: 1*s.* to 1*s.* 1*d.* for fair to good red; ordinary yellow and pale red mixed, 11*d.* to 1*s.*: and common yellow mixed 10*d.* to 11½*d.* per lb. At the last sale on the 27th, grey Jamaica was offered to the extent of 27 bales, all of which were disposed of at from 3*d.* to 4*d.* per lb. cheaper than previous rates. Eleven bales fetched from 1*s.* 7*d.* to 1*s.* 9*d.* per lb., while other qualities brought 1*s.* 6*d.* per lb. Thirteen bales of native Jamaica were offered and 6 sold, 1*s.* 2*d.* being paid for good tawny, 1*s.* for fair red, and 10*d.* to 11½*d.* for inferior yellow mixed.

CASSIA FISTULA, KOLA, TAMARINDS, ETC.

Of the first of these, 6 bags—all that were offered—of fair Dominica pod, were disposed of at 18*s.* per cwt. At the auction on the 13th, 27 packages of kola were offered, one of good small to bold dried Cylon fetching 2½*d.* per lb.; the remainder, slightly mouldy, being bought in at 1½*d.* Some 120 barrels of Tamarinds were offered at the first sale, only 30 of which were sold in bond without reserve at from 11*s.* 3*d.* to 11*s.* 6*d.* per cwt. At the end of the month there was a slight decline, some syrupy Barbados being disposed of at 10*s.* 3*d.* per cwt. At the last sale of the month 3 cases of good West Indian distilled oil of limes were bought in at 2*s.* 6*d.* per

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AGRICULTURAL MEETING AT GRENADA.

For some time past it has been the custom to hold monthly meetings in different parts of Grenada under the auspices of the Agricultural Society, at which the Agricultural Superintendent of the island (Mr. R. D. Anstead, B.A.) delivers an address on some subject of interest in connexion with the cultivation and management of the crops grown in the colony.

Such a meeting was held a few weeks ago at the Hermitage Schoolroom, St. Patrick's, under the presidency of Mr. George D. Kaufmann. About fifty people were in attendance, and the address of the Agricultural Superintendent dealt with some points of special importance in the cultivation of cacao and ground provisions, and the best methods for checking the spread of black blight.

The following details are taken from a report which appeared in the *Grenada Chronicle* of September 5:—

Special stress was laid by Mr. Anstead on the need of selecting seed for planting in case of corn. The best plants were produced from the best seed, and the very best ears of corn should be selected from the crop, and saved for replanting in the next season. In this way, by means of selection only, the yield of corn and the size of ears, would in a few years be largely increased. This principle applied not only to corn, but to every crop, as cacao, nutmegs, and sweet potatos.

The mulching of cacao was also strongly recommended. St. Patrick's parish was very liable to suffer from drought, but the bad effects of this on the cacao crop was largely diminished by judicious mulching. If the soil is kept well covered by 6 or 8 inches of bush, grass, leaves, etc., which may be obtained from waste lands, this keeps the surface soil moist, and by gradual decay provides a rich supply of humus.

MAIZE CROP OF THE UNITED STATES.

According to the *Southern Planter* the maize area of the United States for the present season amounts to 101,000,000 acres, or 1 per cent. more than last year. In the South Atlantic States the acreage is 2 per cent. greater than last year. In Virginia the area planted with maize is 1,873,000 acres, and the condition of the crop is placed at 95 (100 being normal) as against 79 a year ago, and a ten-year average of 90. In Maryland maize has been planted over 649,000 acres, and the return expected is 90 per cent. of a normal crop. In North Carolina the maize area for the season is 2,787,000 acres, the value of the crop being put at 92. The area in Tennessee is 3,014,000 acres, and the condition 87. The general condition of the maize crop throughout the country is estimated at 82 as compared with an average figure for the past ten years of 85.

MARKET REPORTS.

London,—September 29, 1908, The West India Committee Circular; Messrs. Kearton, Piper & Co.; September 29, 1908.

Arrowroot—No quotation.
Balata—Sheet, 2/1 to 2/5; block, 1/7½ to 1/8.
Bees'-wax—Good quality, £7 7s. 6d. to £7 15s. per cwt.
Cacao—Trinidad, 58/- to 75/- per cwt.; Grenada, 50/- to 60/- per cwt.
Coffee—Santos, 25s. 6d. to 35s. 10½d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £17 5s. per ton.
Cotton—St. Vincent, and Barbados, 18d. to 21½d.; West Indian, good medium, 9d.; West Indian Sea Island, good medium to mediumfine, 14d. to 14½d.; fine, 15d.; extra fine, 17d. per lb.
Fruit—
  Bananas—Jamaica, 4/- to 6/- per bunch.
  Limes—No quotations.
  Pine-apples—Antigua, 10s. to 14s. per barrel; St. Michael, 2/6 to each.
  Grape Fruit—15/- to per box.
  Oranges—Jamaica, 7/6 10/6 per box.
Fustic—£3 10s. to £4 10s. ton.
Ginger—Dull.
Honey—Brown to good pale, 18s. to 34s. per cwt.
Isinglass—West India lump, 8 per lb.; cake, no quotations.
Lime Juice—Raw, 10d. to 1/2 per gallon; concentrated, £15 10s. per cask of 108 gallons; distilled oil, 2/4 per lb.; hand-pressed, 3 to 4/6 per lb.
Logwood—£3 10s. to £4 per ton; roots, £2 10s. to £3 10s. per ton.
Mace—Quiet; no quotation
Nutmegs—Steady.
Pimento—Quiet.
Rum—Jamaica, 3/3 to 8/-; Demerara, 1/6 to 1/7 per gallon; Trinidad, no quotation
Sugar—Crystals, 15/3 to per cwt.; Muscovado, 12/6 to 13/9; Syrup, 9s. to 6d.; Molasses, no quotations.

New York,—October 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12¾c. to ; Grenada, 12½c. to 13c.; Trinidad, 13¼c. to 1 Jamaica, 10¼c. to 12½c. per lb.
Cocoa-nuts—Jamaica, $28·00 to $30·00; culls, $16·00; Trinidad, $2 to $30·00 per M.
Coffee—Jamaica, ordinary c. to 7½c.; good ordinary, 7¾c. to 8¾c.; washed, 9c. c. per lb.
Ginger—10¾c. to 13¾c. p
Goat Skins—Jamaica, 5 Antigua and Barbados, from 49c. to 5c.; St. Th St. Croix, St. Kitt's, 46c. to 47c. per lb., dry f
Grape Fruit—Jamaica, to $7·00 per barrel; $2·50 to $4·00 per box.
Limes—$1·00 to $3·00 p el. Market over-stocked.
Mace—27c. to 32c. per l
Nutmegs—110's, 9c. per
Oranges—Jamaica: $3 $4·50 per barrel; $1·75 to $2·25 per box.
Pimento—3⅛c. to 3¾c. p
Sugar—Centrifugals, 96c.; Muscovados, 89°, 3·48c.; Molasses, 89°, 3·23c., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., October 6, 1908; Messrs. Leacock & Co., October 10, 1908; Messrs. T. S. Garraway & Co., October 12, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica and St. Lucia, $14·00 per 100 lb.
Cocoa-nuts—$20·00 for husked nuts.
Coffee—Jamaica and Ordinary Rio, $8·50 to $10·50 per 100 lb.
Hay—$1·20 to $1·50 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·75 to $3·00; loose, $2·00 per 100 lb.
Potatos—Dutch, $2·80 per 160 lb.
Peas—Split, $6·50 to $6·75 per bag of 210 lb.; Canada, $3·95 per bag of 120 lb.
Rice—Ballam, $5·40 to $6·10 (180 lb.); Patna, $3·50 to $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, October 3, 1908; Messrs. Sandbach, Parker & Co., October 3, 1908.

Arrowroot—St. Vincent, $9·00 to $9·50 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—60c. to 96c.
Cassava Starch—$7·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb.
Dhal—$5·10 to $5·40 per bag of 168 lb.
Eddos—$1·32 per barrel.
Molasses—No quotations.
Onions—Madeira, 2¼c. to 2½c.; per lb.
Plantains—12c. to 28c. per bunch.
Potatos—N.S. $2·50 to $2·75
Potatos—Sweet, Barbados, $1·32 per bag.
Rice—Ballam, $6·00 to $6·25; Creole, $5·25 to $5·50 for good; Seeta, $6·00.
Split Peas—$6·75 per bag (210 lb.); Lisbon, no quotations.
Tannias—$1·68 to $1·80 per bag.
Yams—White, $2·16; Buck, $2·40 per bag.
Sugar—Dark crystals, $2·07 to $2·20; Yellow, $3·10; to $3·20; White, $3·50 to $3·70; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
—— Cordwood—$2·40 to $2·64 per ton.

Trinidad,—October 3, 1908. Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·60 to $12·75 per fanega; Trinidad, $12·00 to $12·50.
Cocoa-nuts—Selected, $22·00 per M. f.o.b.
Cocoa-nut Oil—67c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. to 8½c. per lb.
Copra—$3·10 to $3·25 per 100 lb.
Dhal—$4·60 to $4·70 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $4·75 to $4·80 per bag.
Split Peas—$6·50 to $6·75 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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Planters and Departments of Agriculture.

THE value of the work of a Department of Agriculture depends largely on the intimacy of the relations between the planters and the scientific officers of the Department. This implies that while the officers of the Department must be interested in the work of the planters, the planters in turn must also be interested in the work of the Department.

This latter duty is sometimes imperfectly recognized, and the feeling may arise that the interests of the planters, so far as the Department is concerned, will be safeguarded without much effort on their own part.

The interest required is not merely that which consists in reading, and possibly applying, the suggestions, and the information contained in the reports, etc., which emanate from the Department, but involves also the effort to keep the Departmental observers informed of the various points in the daily round of planting work, so that points of success, as well as points of difficulty, may be correctly appreciated by both sides.

The ideal condition would probably be reached if the results of reaping each crop were submitted by the planters to the Agricultural Officers, so that the reasons for successes and failures might be investigated and recorded. It is obvious that both sides would benefit by this procedure.

A great deal of the planter's daily work may be made to have an experimental and scientific value without much effort, provided only that observations are made and records kept. (For example, the effect of the application of any manure may be measured by leaving a portion of the field untreated and comparing the remainder with that. At present it is customary to apply the dressing to the whole field so that there is no knowing what would have happened if the manure had not been used. A few observations of this kind carefully correlated by scientific officers would soon give rise to knowledge of a most valuable kind.

Similarly, slight variations might be made in the methods of cultivation, and the results noted and compared; these would undoubtedly throw a flood of light on many vexed questions.)

If this aspect of the question were grasped by planters it would in turn react most beneficially on the scientific workers whose attention would constantly be called to the methods of local practice, and their merits and defects. At present, scientific work is retarded from a want of accurate knowledge of many points relating to planting work. This want might easily be remedied by increasing the exchange of information in the manner indicated.

There is a danger that the scientific workers may pursue lines of investigation which carry them out of touch with the planters among whom, and for whom, they live. These investigations may be useful and valuable, they may indeed be quite necessary: but if they tend to separate planter and scientist their value is lessened and the efforts of some other worker will be necessary to bring the two together again.

The scientific worker should be required as part of his duty to carry on investigations of an abstract character so as to extend knowledge, and to keep his mind alert and capable of dealing with new problems; if his time and attention are wholly occupied in dealing with so-called 'practical' duties, he will soon lose his mental alertness and fail to deal successfully with the problems presented by the planter. Constant intercourse with the affairs of the planter will ensure that his work does not cause him to lose touch with the problems he is required to handle.

The work of a Department of Agriculture will be much advanced in usefulness if the planters will realize, and act upon, the idea that it is incumbent on them to approach the scientific workers with their knowledge and their problems, as well as for the scientific worker to approach the planter, and happily, in many instances, this desirable state of affairs is found to exist.

B. 208 in Queensland. In the report on sugar-cane experiment work carried out in Queensland in 1907, it is mentioned that the seedling cane B. 208 was introduced into the trials during the past year. Speaking of this seedling the report says: 'B. 208 is a cane with a strong record as a sugar producer, both in the West Indies, and also in the Herbert river district, North Queensland, and the results obtained with it at the Mackay Experiment Station will be awaited with interest.'

SUGAR INDUSTRY.

Varieties of Sugar-cane at Antigua, 1907-8.

A meeting of the Agricultural and Commercial Society of Antigua was held on September 28 last, under the presidency of his Excellency the Governor of the Leeward Islands, at which an account of the results obtained in the experiments with varieties of sugar-cane, carried on in the island during the season 1907-8, was laid before the members by Dr. Francis Watts, C.M.G.

The yields of sucrose, in pounds per gallon of juice, and in pounds per acre respectively, given by the principal varieties cultivated during the season, are set out in the accompanying statements:—

PLANT CANES.

(Means of sixteen plots in the case of every variety.)

Name of cane.	Sucrose in pounds per gallon of juice.	Yield of sucrose in pounds per acre.
Sealy Seedling	2·02	5,730
B. 208	2·34	5,640
D. 109	2·05	5,500
B. 156	2·05	5,460
B. 306	2·15	5,170
B. 393	2·21	5,140
W. Transpt.	2·22	5,100
Mont Blanc	2·16	5,070
D. 99	2·22	5,100
B 109	2·16	5,070
Burke	2·15	4,890
D. 116	2·98	4,820

RATOON CANES.

The following table shows the returns obtained in the ratoon cane trials. It will be seen that most of the varieties included in the plant canes experiments were also under trial as ratoons. The returns here shown are, in every case, the means of fourteen plots:—

Name of cane.	Sucrose in pounds per gallon of juice.	Yield of sucrose in pounds per acre.
D. 109	2·09	4,370
Sealy Seedling	2·08	4,360
B. 306	2·15	4,210
B. 147	2·07	4,140
B. 376	2·23	4,100
D. 74	2·13	4,040
B. 208	2·29	3,920
B. 156	1·99	3,870
B. 109	2·10	3,850
W. Transpt.	2·29	3,850
Mont Blanc	2·14	3,810
D. 95	2·19	3,730

On the basis of the results of these experiments, the varieties Sealy Seedling (for poor soils), B. 208 (for good soils), B. 156, B. 306, and possibly D. 109, are recommended for cultivation at Antigua.

Attention was drawn by Dr. Watts to the fact that the yields from the plant canes had been below, while the yields of ratoon canes had been about equal to, the average of previous years. At first it was thought that the falling off might have been occasioned by root disease, but as this would probably have affected the ratoon canes more than the plants, another reason was sought, and it was suggested that the yield from the plant canes was lowered by the unusually heavy rainfall of September 1906, when from 18 to 22 inches were recorded on various estates. This interfered with the cultivation, and the results are apparent in the small crops of plant canes reaped in 1908 on heavy soils. The light soils of the limestone districts appeared to have benefited.

Dr. Watts ventured to predict that the causes which led to a reduced crop of plant canes would probably lead to an increase in the amount of root disease in the first ratoons now growing. He advised his hearers to be on the alert to recognize root disease and to take precaution to check its development, indicating that good cultivation and resting the land from cane crops were amongst the best means to this end.

In this connexion the widespread prevalence of root disease among canes in Antigua, at the present time, was alluded to, and Dr. Watts advised all planters to make an examination of their young ratoon canes, to ascertain if the disease were present.

NEW VARIETIES OF CANE.

Some information was given concerning the returns obtained with a number of new varieties of cane, which are under experiment, but which have not yet been brought into general cultivation. The chief of these canes, together with the returns given by them, are shown in the accompanying table. The yields of sucrose mentioned represent the means of four plots (plant canes) in the case of every variety :—

Name of cane.	Sucrose in pounds per gallon of juice.	Yield of sucrose in pounds per acre.
B. 4,596	1·89	7,940
B. 1,528	2·05	7,000
D. 2,190	2·16	6,840
B. 1,753	1·86	6,410
B. 1,030	2·04	6,130
B. 1,355	2·12	6,090
D. 132	1·98	5,930
B. 3,289	2·03	5,480
B. 3,696	1·93	5,270
D. 111	1·91	5,270
B. 1,529	2·35	5,230
D. 3,159	2·15	5,000

Sugar Production of the World, 1907-8.

A tabular statement, prepared and published by the Bureau of Statistics of the United States Department of Agriculture, shows the amounts of sugar produced by the various countries of the world in which cane and beet are cultivated, in 1907-8, and also in the four preceding years.

The total world's crop of cane sugar for 1907-8 was 7,233,477 tons. This is greater than the amount produced in any previous year, with the exception of 1906-7, when the production reached 7,360,172 tons. In 1905-6 it was 6,735,081 tons.

The cane-sugar crop of Louisiana and Texas for the year under review was 317,000 tons, while 420,000 tons were produced in Hawaii and 217,000 tons in Porto Rico. This makes a total of 984,000 tons for the United States, as compared with 845,871 tons yielded in 1906-7, and 938,225 tons in 1905-6.

In 1907-8, Cuba produced 1,200,000 tons of cane-sugar, this being about equal to the return of 1905-6, but 228,000 tons less than that of 1906-7. The West Indian Islands other than Cuba and Porto Rico yielded in the past season 291,000 tons of sugar, while in 1906-7 the production of these islands was 279,631 tons, and in 1905-6 it reached 302,163 tons. Mexico showed an increase in the sugar output in the past year, advancing from 108,000 tons in 1906-7 to 115,000 tons in 1907-8. If to the above figures we add the production of Central and South America, this gives the total cane-sugar output of the western continent for 1907-8 at 3,195,000 tons. This enormous quantity, however, was exceeded by the amount produced in Asia during the year—3,481,477 tons. Africa yielded a cane-sugar crop of 270,000 tons (a considerable drop on the output of the two previous years), and 276,000 tons were produced in Australia, New Guinea, etc.

Coming to the figures relating to the beet sugar production of the world in 1907-8, it is seen that the total crop from all countries is 6,996,897 tons, or nearly half a million tons less than the cane-sugar crop. The crop is less by 163,000 tons than the beet crop of 1906-7, and less by 227,000 than that of 1905-6.

In the United States beet sugar was produced to the amount of 413,954 tons in 1907-8, while in 1906-7 the crop was 431,796 tons; in 1905-6, however, only 279,393 tons were produced. In a note appended to the statistical table it is pointed out that while cane-sugar is but just holding its own from year to year in the United States the production of beet sugar has more than doubled in six years.

The output of beet sugar in Canada was but 7,943 tons in 1907-8, as compared with 11,367 tons in 1906-7, and 11,419 tons in 1905-6. Among European countries, Germany has been the leading producer in the past year, with an output of 2,135,000 tons.

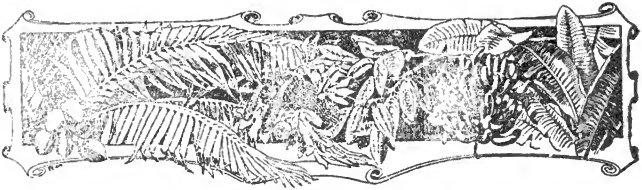
BERMUDA BOTANICAL DEPARTMENT.

An account of the work of the Botanical Department of Bermuda, prepared by the Superintendent of the Public Gardens, is included in the *Annual Report* on the colony for 1907.

The total expenditure made last year in connexion with the Department was £2,177 16*s*. 6*d*. Of this £500 was allotted to insect pest destruction work (chiefly the 'fruit fly'—*Ceratitis capitata*), and £373 6*s*. 11*d*. was spent on tobacco cultivation.

The Fruit Fly Destruction Act came into force on March 1, 1907, and has now passed the experimental stage. The work is proceeding on sound lines and promises good results.

Altogether there are fifty-four kinds of fruit under cultivation at Bermuda. Experimental plots of Canary bananas have been established in different districts, and it is hoped to develop an export trade in this fruit. Strawberry growing is rapidly expanding: 200,000 plants have been imported, and plants of 110 varieties are under culture at the Public Gardens. The green vegetable industry is being encouraged by the trial of different varieties, and the distribution of suitable kinds to growers. From the area under tobacco culture, 1,000 lb. of leaf suitable for wrapper was cured and baled.



WEST INDIAN FRUIT.

THE 'SANDERSHA' MANGO.

Under the heading 'Promising New Fruits,' an article appears in the recently issued *Yearbook* (1907) of the United States Department of Agriculture, which contains particulars (with coloured illustrations) of the characteristics of a number of fruits of different varieties that are at present under experimental culture by the Department, and all of which promise to be of special excellence. Among these fruits is a mango of Indian origin, known as the 'Sandersha' variety, first introduced into Florida in the year 1901, and of which the following particulars are given:—

Of the mangos that have so far fruited sufficiently in Florida to disclose their distinctive characteristics, the Sandersha is one of the most unique, and in certain respects the most promising. It was introduced by the Section of Seed and Plant Introduction in 1901, having been received from Bangalore, India, in the form of two inarched trees. A second lot of inarched trees received from Mr. W. Gollan, Superintendent of the Government Botanic Station at Saharanpur, India, under the name 'Sundershah' has not yet fruited, but is believed to be the same sort. Little appears to have been published in India, regarding the variety, but at the Subtropical Laboratory of the Department at Miami, Florida, where it has been fruited for two seasons, it has proved very productive, of exceptionally large size, fine dessert quality, and very late ripening season, all of which points are apparently in its favour as a commercial sort. Mr. P. J. Wester, of the Subtropical Laboratory, considers cross-pollination necessary to insure productiveness.

The Sandersha mango is long in form, compressed, and rather slender, tapering toward stem and terminating in a distinct curved beak at the apex; size very large, averaging about 20 oz. in weight, and occasionally attaining a weight of 2 lb.: stem stout, apex prominent, curved and 'beaked;' surface smooth: colour clear yellow, with a faint pinkish blush in the sun; dots numerous, small, russeted: skin moderately thick; seed long, curved, thin, small in proportion to size of fruit and thickness of flesh; flesh rich reddish-yellow, juicy and tender, almost entirely free from fibre: flavour refreshing in the fresh state, though with rather less aroma than the Mulgoba. Its higher acidity will doubtless render it more acceptable for serving in sliced form than are most of the mangos thus far obtainable in the United States' markets. This mango is a late variety, ripening in the latter part of August at Miama, Fla. The 'Sandersha' is considered well worthy of testing in the mango districts of Florida, Porto Rico, and Hawaii.

COCOA-NUT INDUSTRY IN THE SEYCHELLES.

The production of cocoa-nuts, and the manufacture of oil, copra, and soap, constitute the agricultural industry of second importance in the Seychelles Islands, the chief industry being the cultivation of vanilla. From the particulars given in the *Annual Report* (1907-8) of the Curator of the Botanic Gardens in the Seychelles, it is seen that the cocoa-nut crop for the past year showed a large increase on those of the two previous years. The total number of nuts produced was 21,716,408. Of the nuts about 13½ millions were converted into copra for export, while the remainder were disposed of in various ways, or consumed locally. The value of the exports of cocoa-nuts and cocoa-nut products amounted to £51,424.

Copra manufacture is steadily increasing in the islands and as a result there has been a continual rise in the price of the nuts during the past two or three years. In 1905 the price of 100 nuts fell as low as 2*s.* In 1906 it rose to 3*s.*, and in the year under review the average price per 100 has been 5*s.* 3*d.* Many local firms are engaged in the industry, and the value of the cocoa-nut estates in the island are stated to have more than doubled since 1906-7.

In the past little attention has been paid to the manuring of cocoa-nut plantations in the colony, but with the increased value of the products a few planters are giving attention to manuring in the hope of increasing their returns. One planter applied stable manure at the rate of 50 lb. per. tree, later on giving in addition 6 lb. per tree of a mixture of guano, kainit, salt, and lime, and the results he has obtained would certainly go to indicate that much more manuring might be done in the cocoa-nut plantations of the islands, with profitable results. In the year following the above applications the cocoa-nut crop of the estate rose to an average of sixty-one nuts per tree, as compared with an average of thirty-one nuts in the preceding year. In experiments carried out in other parts of the colony, 2 cwt. of kainit and 4 cwt. of guano were mixed and applied per acre, and in addition a crop of velvet beans was grown on the soil beneath the trees, in order to assist in providing a supply of nitrogen for the cocoa-nut crop.

The velvet beans are reported to grow remarkably well on the coral soil of the Seychelles Islands. It appears that the vines are allowed to climb over the palms to a certain height, after which they are cut down and dug into the soil.

DOMINICA PRODUCE AT THE COMING COLONIAL FRUIT SHOW.

It has been decided that the island of Dominica shall participate in the Colonial Fruit and Vegetable Show, to be held under the auspices of the Royal Horticultural Society in London, on November 26 and 27 next, and the Dominica *Official Gazette* of October 17 contains a letter from Dr. H. A. Alford Nicholls, in which he states the classes at the Show under which produce from the island may be exhibited, and mentions the arrangements that have been made.

The classes in which Dominica produce may compete are those for (*a*) pine-apples, (*b*) bananas, (*c*) oranges, (*d*) limes, (*e*) shaddocks, pomelows and other such fruit, (*f*) yams, sweet potatos, and other tubers, (*g*) vegetables other than tubers, (*h*) bottled fruit in clear glass bottles, (*i*) jams, jellies, and syrups, shown in clear glass bottles.

Mr. J. A. Brooks, Acting-Secretary of the Permanent Exhibition Committee, is carrying out the arrangements for collecting and despatching the exhibits, which will be sent forward by the Royal Mail steamer leaving Dominica on November 1. The exhibits will be consigned to Mr. A. E. Aspinall, the London representative of the Permanent Exhibition Committee of Dominica, who will arrange for their display at the Show.

Medals and other prizes will be given in each class at the discretion of the Council of the Royal Horticultural Society.

Dr. Nicholls, in the course of his letter, expresses a hope that growers of fruit and vegetables will help in making known the capabilities of the island by sending on fine exhibits of their best products, which, as he points out, will greatly aid the persistent efforts that are now being made to popularize Dominica limes in Great Britain.

CITRATE OF LIME AT DOMINICA.

The Curator of the Botanic Station, Dominica, in his latest *Annual Report* (1907-8) makes the following reference to the progress of the citrate of lime industry in the island :—

> Considerable progress has been made in the manufacture of citrate of lime in Dominica during the past year. During 1906, the year in which citrate of lime was first exported from the island, 728 cwt. of this product were produced. In 1907, 2,388 cwt. of citrate of lime were shipped, showing an increase of 1,660 cwt.—a very satisfactory advance.
>
> The great drawback in making citrate in Dominica at present is the cost of drying the product. What is required is efficient machinery for cheaply and quickly drying the citrate without loss of acid. When such an apparatus can be obtained without necessitating the expenditure of too great a sum, the chief obstacle in the making of citrate of lime by estates will have been removed.
>
> Should such machinery be of too costly a character for estates making 80 to 100 hogheads of concentrated juice, then the development of factories may be expected at suitable points in the several districts for the purchase of lime juice from adjoining estates, to be made into citrate of lime.
>
> No doubt many difficulties are met with in new enterprises of this kind. These are usually overcome as experience is gained. It is hoped that the cost of drying citrate may be greatly reduced and that this product may shortly rank as one of the chief exports of Dominica.

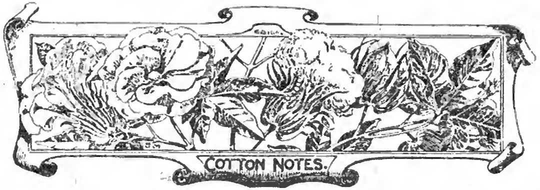
SULPHATE OF AMMONIA AND ACIDITY IN SOILS.

A note in a recent issue of the *Gardeners' Chronicle* draws attention to the 'curious appearance of the herbage' in a grass plot at the Rothamsted Agricultural Experiment Station, England, which has been manured continuously with sulphate of ammonia and chloride of ammonia for a long period of years. The vegetation on this plot is described as being composed almost entirely of three grasses, while the surface soil consists of a peat-like mat of semi-decayed plant remains. The following particulars are given of investigations carried out in connexion with the condition of the soil of this plot :—

> Recent investigations that have been made in the laboratory show that the soil has become acid, a result that often may occur as a consequence of the long-continued use of ammonium salts. It was found that the organisms which ordinarily oxidize the ammonia to nitrates were only present in small quanities, and their action was almost inhibited owing to the acidity of the soil. The slight amount of nitrification observed, together with other facts, which need not be considered here, point to the conclusion that the oxidation is attributable to the beneficial action of the small residual quantity of lime present in the soil. This acts partly, no doubt, as locally neutralizing the acidity, and it is possible that further investigation may show that its influence may also be connected with other physiological properties which this substance is known to possess. The acidity of the soil is, at least mainly, brought about by the action of various micro-fungi, which are able to utilize ammonia, setting free the acid in the soil. The general result of the investigation, which has a practical value of considerable importance, indicates that 'the decline in fertility of the acid plots may be attributed to the repression of the normal bacterial activities of the soil, and the encouragement of the growth of moulds.'

It will be remembered that the question of acidity in soils brought about as the result of long-continued applications of sulphate of ammonia was referred to at the West Indian Agricultural Conference held at Barbados in January last, by Professor J. B. Harrison, C.M.G., in connexion with the sugar-cane experiments carried out in British Guiana. As the result of suggestions made to Professor Harrison that the falling off in the productive power of some of the cane fields in which experiments were carried out might be due to the lengthy period over which sulphate of ammonia had been regularly applied, the subject was investigated and experiments were conducted which lasted over three years.

The results of the experiments, however, did not support the theory put forward, as a change in the manurial treatment from sulphate of ammonia to nitrate of soda brought about a further lowering of the yield of cane, and Professor Harrison stated it as his opinion, that on heavy clay soils, such as those of the experiment fields of British Guiana, and under tropical meteorological conditions, the deflocculation or puddling, caused by long-continued dressings with nitrate of soda, is likely to prove more injurious to the productive power of the soil than is the souring action, either direct or indirect, of sulphate of ammonia.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date October 12, with reference to the sales of West Indian Sea Island cotton :—

Owing to the strike, most of the mills using Sea Island cotton are closed, with the result that only about 120 bales of West Indian Sea Island cotton have been sold, and these chiefly for export.

The sales include Anguilla and Antigua at 13¼*d.*, Barbados at 14*d.*, St. Vincent at 16½*d.*, and a few Stains and Linters.

The American Sea Island cotton is coming forward, but until there is some prospect of a settlement in the strike, spinners in the country are not disposed to enter into operations.

COTTON IN THE SEA ISLANDS.

The Sea Island cotton reports of Messrs. W. W. Gordon & Co., of Savannah, dated October 2 and 9 respectively, both speak of the favourable weather which prevails in the Sea Islands for gathering in the cotton crop, and picking is stated to be in active progress. The market conditions have been quiet so far, and few sales have been effected. It is mentioned that the strike in Lancashire, and political conditions in the United States and in Europe are all against an advance in price.

Messrs. Henry W. Frost & Co., of Charleston, writing on October 3, report as follows :—

The total receipts to date of new season's cotton from the Sea Islands amount to 555 bales. As the crop will be coming in freely from now on, factors have given out samples of lots so far received, and are anxious for the market to open. The prices asked are : 'extra fine' quality 30c. per lb., 'fully fine' 28c., and 'fine' 27c. per lb. These figures are somewhat above the views of buyers, and no sales have been made as yet. The crop lots are not yet being offered for sale.

COTTON GROWING AT TOBAGO.

Some interesting notes (prepared by Mr Thomas Thornton, A.R.C.S.) on the possibilities of Sea Island cotton cultivation at Tobago are printed as one of the appendices to the report on the proceedings of the late Cotton Conference at Manchester.

It is evident that cotton was formerly a crop of great value at Tobago. According to a reliable source of information over 2,500,000 lb. of cotton were produced in the island in 1780, and in the *Encyclopaedia Britannica* (1854 edition) it is mentioned that the cotton of finest quality ever placed on the English market was grown on Golden Grove estate, Tobago, about the year 1790.

Experiments in the cultivation of Sea Island cotton have been carried on in the island during the past few years under the Agricultural Department. Some estates have started trial cultivations, and a number of peasants planted cotton on a small scale. Although the crop unfortunately did not receive the care and attention given to it in the other islands, some of the cotton produced compared favourably with that grown elsewhere. For the 1908 planting, the Agricultural Department imported 1,200 lb. of the best cotton seed from Barbados, and this will be sold to growers at cost price. It was generally expected that a much larger acreage of the crop will be planted than in past years.

To encourage the industry, the Government of Trinidad and Tobago has erected a ginnery at Scarborough. Two power gins have been installed, and this season's work has been commenced. Six bales of cotton have already been ginned, but it is of importance to mention that the factory is in a working condition, ready to gin all the cotton that will be produced in the island for some time to come. Not only has the Government erected a ginnery, but £150 was set apart for the encouragement of Sea Island cotton cultivation in 1907-8. For the year 1908-9, £300 more has been set apart for the same purpose.

CYCLONE DAMAGE TO COTTON AND OTHER CROPS AT MONTSERRAT.

According to the *Montserrat Herald* of October 10, the cyclone which passed over the island a fortnight previous did considerable damage to the cotton and other crops in some parts, although in others no injury whatever was experienced.

At Roach's, about 50 per cent. of Mr. Johnson's crop is reported to have been destroyed, and some fields have had to be replanted. Dagenham estate did not suffer at all, while at Webbs and Amersham, the damage done is estimated at 10 per cent. of the value of the crop. At O'Garas a 5-acre field of cotton was entirely destroyed, and in St. George, Whites and Bethel lost about 50 per cent. of their cotton cultivations. In St. Peter, Mr. J. Harper of Braid was the chief sufferer, the damage done to his cotton being estimated at from 25 to 30 per cent. of the value of the whole.

The bread-fruit and banana crops at Montserrat were also largely damaged. The bread-fruit trees were either uprooted or the fruit broken off by the gale, while it is reported that practically all the banana trees in the island have been destroyed.

SALE OF AGRICULTURAL PRODUCE AT GRENADA.

An Ordinance has recently been passed in Grenada which has for its object the amendment of the law relating to the sale of cacao, nutmegs, and cotton by peasant proprietors to dealers in the island.

By this amendment it is provided that no person may carry on business as a dealer in agricultural produce in Grenada unless he has previously applied for and obtained a licence from a magistrate in the island.

It is further enacted that all cacao, cotton, or nutmegs purchased from a peasant proprietor shall be paid for in cash, and payment, either wholly or partly, by means of goods, shall be illegal, so that no licensed dealer can maintain an action at law against a peasant proprietor in respect of goods stated to be delivered as the price of any cacao, nutmegs, or cotton. On the other hand, a small proprietor can recover from a dealer to whom he has sold his produce, the money value of the whole or any part of this produce which shall not have been paid for in cash.

If, however, any sum of money has been lent or advanced by the dealer to small cultivators, the produce of the latter may be legally retained by the dealer on account of the debt.

RESULTS OF EXPERIMENTAL RUBBER CULTURE AT DOMINICA.

Three kinds of rubber-yielding trees, Para (*Hevea brasiliensis*), Central American (*Castilloa elastica*), and *Funtumia elastica*, are being grown experimentally at Dominica, and during the past two or three years samples of rubber have on several occasions been prepared, in order that some idea might be gained as to the possibilities of return which may be expected from these varieties of trees in the island. The following account of the latest experiments in rubber tapping and preparation at Dominica appears in the 1907-8 report of the Curator of the Botanic Station:—

Since the publication of a brief note in the *West Indian Bulletin*, Vol. VIII, No. 2, on rubber-producing trees at Dominica, experiments in tapping three Para rubber trees (*Hevea brasiliensis*) at the Botanic Station have been made.

Daily tappings on the half spiral system were made until several cakes of rubber had been obtained. This rubber was forwarded to London in November 1907, for report, along with samples of Castilloa and Funtumia rubber obtained from trees growing at the Botanic Station. The Para rubber was valued at from 4*s.* to 4*s.* 2*d.* per lb., and was described as being by far the best of the various samples sent.

This is the first occasion on which Para rubber trees have been tapped in Dominica. The tree is very easy to tap, and the yield of latex is good. After collection in the early morning, the milk was strained through fine gauze. It was then placed in a circular vessel, and a little lime juice added to hasten coagulation. Twenty-four hours later the cake of rubber was ready to be lifted out. It was pressed to get rid of as much moisture as possible and afterwards placed to dry in the shade. By this system nice amber-coloured biscuits of rubber were obtained. The process is simple and the results good.

Judging by the above experiment the Hevea appears to give a greater yield of rubber than Castilloa trees of a similar age. The preparation of Para rubber is shorter and easier than that of Castilloa. The drawback to Hevea cultivation in Dominica is the liability of the trees to become uprooted during the prevalence of high winds following heavy rains. If planted in Dominica, the trees should be given sheltered positions.

During 1907, the Department of Agriculture imported 3,000 Para rubber seeds from Ceylon. Many of the seeds had commenced to germinate on the way, but this did not result in any loss. The importation was very successful, over 80 per cent. of plants being raised. If desired by planters, importations of these seeds will be made yearly from the East until the trees at the Botanic Station can supply the number of seeds sufficient to meet the local demand.

Two samples of Castilloa rubber, one from the Botanic Station and one from Stowe estate, have also been forwarded to London for report and valuation. This took place in August 1907, and the samples were valued at 4*s.* per lb. The samples were obtained by creaming. This process is very tedious. Some acid or other agent is required that will coagulate Castilloa latex as readily as acetic, citric, and other acids coagulate the latex of Hevea trees. The preparation of Castilloa rubber would then be considerably simplified.

Although a considerable quantity of Castilloa seed was distributed to planters, it is evident that during the year under review but little planting of Castilloa trees was done.

Some Funtumia trees at the Station which were tapped but gave only an unsatisfactory yield in 1905, were again tapped in the past year, but the result was once more unsatisfactory. In Dominica this variety cannot compare in yield with Hevea and Castilloa trees of the same age. In order to recommend themselves for general cultivation, they must give a fair return of rubber when eight to nine years old. Funtumias do not fulfil this requirement at the Botanic Station in Dominica. It may be that the climate is too dry; but, on the other hand, the trees are healthy and grow well, though somewhat liable at times to attacks of black blight.

AGRICULTURAL SOCIETY OF GERMANY.

From particulars given in the *Experiment Station Record* of the United States Department of Agriculture (July 1908), it would appear that the Agricultural Society of Germany is the largest of its kind in the world.

The Society has a membership of about 15,000, and its wide range of activities include not only experimental work and the dissemination of agricultural information, but also the purchase and inspection of supplies. For example, it has departments for the purchase of fertilizers, feeding stuffs, and seeds, and all members buying their supplies by this means have the quality of the various articles guaranteed.

A recent report shows that during the year 1907 members bought through the Society some 373,150 tons of fertilizing materials. Analyses of the feeding stuffs and fertilizers are made by the agricultural experiment stations free of cost to the members under an arrangement by which the manufacturers pay the stations for the analytical work. During the past year 3,936 analyses of fertilizers were made under this arrangement, of which 3,490 were found to be up to the guaranteed quality, and 446 or 11·13 were found to be too low. The largest purchases made through the Society were of potash salts—260,000 tons, while basic slag came second in quantity, 74,000 tons; followed by lime 23,000 tons, and smaller amounts of superphosphates, nitrate of soda, bone-meal, and calcium cyanamide.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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NOTES AND COMMENTS.

Contents of Present Issue.

The relationship that should exist between planters and officers of Agricultural Departments is discussed in the editorial, which has been contributed by Dr. Francis Watts, C.M.G.

An account of the chief results obtained in the sugar-cane variety experiments at Antigua during 1907-8 will be found on pp. 338-9.

A mango of Indian origin, known as the 'Sandersha' variety, and lately introduced into Florida is regarded as being of exceptional promise (page 340).

A collection of Dominica produce is to be forwarded to the Colonial Fruit and Vegetable Show that will be held in London at the end of November. Citrate of lime shipments from Dominica for 1907-8 show a large increase over those of 1906-7 (page 341).

Under Cotton Notes (page 342) will be found reports on market prices, together with some details on the prospect of cotton growing at Tobago. Notes on the results of experimental rubber cultivation at Dominica appear on the following page.

On the Insect Notes page (346) is given the concluding portion of Mr. Ballou's article on 'The Diptera,' and also an article dealing with the various kinds of fleas.

In this number of the *Agricultural News* a 'Students' Corner' has been instituted with the object of giving assistance to young men entering on the Reading Courses in Agriculture which have lately been established in the West Indies (see page 347 for details).

Chief Agricultural Products of Bermuda.

In 1907, the quantity of potatos exported from Bermuda was 32,860 barrels and 37 crates, having a value of £28,864. In the previous year the value of the potato exports was but £15,281. The onion crop of 1907 was also a good one, although the total return was not so large as in 1905. The shipments of onions were of the value of £63,189, as compared with £44,776 in 1906. The lily bulb crop is described as a small one, although the exports of this article show a continuous increase during the past three years. The value of the shipments in 1907 was £9,612 as against £8,860 in 1906. Practically the whole of the above exports went to the United States.

◆

Liverpool Colonial Products Exhibition.

The Permanent Exhibition Committee of Antigua are forwarding by the mail leaving there on October 17, a collection of products for the Liverpool Colonial Products Exhibition which will be held from November 22 to 26. The exhibit consists of some ninety separate articles representing the industries and resources of the island, together with curious and ornamental and decorative material. A leaflet descriptive of the island, its character, and resources has been prepared for distribution at the Exhibition. Some difficulty has been experienced in getting together a suitable collection of products, as at the present time the sugar crop has been long since concluded, and cotton picking has not commenced: consequently it was found necessary to start collecting samples for the Exhibition so long ago as the middle of July last.

The exhibit has been consigned to the care of Mr. A. E. Aspinall, Secretary of the West India Committee, who will arrange for its display at Liverpool.

◆

Anthrax at St. Vincent.

It is satisfactory to note from the tables given in the *Annual Report* (1907-8) of the Government Veterinary Surgeon of St. Vincent that the efforts made by the Imperial Department of Agriculture to stamp out anthrax from among the live stock of the island are having good effect. While the number of deaths among stock from anthrax during the first three months of 1907, before organized vaccination and proper disposal of carcasses were started, was 217, it fell to 87 during the corresponding three months of 1908 after a system of vaccination and disposal of carcasses (by taking them some distance out to sea, and sinking them) was started.

The total number of deaths among stock of all kinds during the year ending March 31 last was 470. This included 189 cattle, 118 pigs, 101 goats, 30 sheep, 26 asses, and 6 horses. The report points out that anthrax is far more prevalent among stock belonging to small proprietors than on estates, and this is attributed to the practice among the labouring classes of cooking and eating meat from animals which have died of the disease. The total number of animals vaccinated during the year was 5,554.

Agricultural Bank for St. Croix Sugar Planters.

An Ordinance has recently been passed at St. Croix as a result of which sugar planters in the colony are enabled to obtain pecuniary assistance for the cultivation of the cane crop.

The Government of the colony is prepared to advance before October 31, 1908, an amount not exceeding £1,600 from the St. Croix Immigration Fund, to be expended solely in connexion with the sugar industry. Planters may not borrow a sum which exceeds £1 per acre of canes cultivated, and no advances will be made to cultivators having less than 10 acres in canes. Loans made in this way will form the first claim on the growing crops, and in the case of estates manufacturing their own canes, the sums advanced must be repaid, together with 4 per cent. interest, in three equal instalments, in April, May, and June next. Where canes are sold to central factories, the loans will be repaid by means of a certain fraction of the payment for each lot of canes delivered. Sums not repaid by June 15 next will be charged 6 per cent. interest after that date.

During the six months from November 1 next, the Government is also prepared to advance another £4,000 from the same source, on the same general conditions as above. In this case no loans will be made to cultivators having less than 5 acres in cane.

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Castor Oil Plants as Green Dressing.

A crop of castor oil plants was lately grown in a field at Molyneux estate, St. James, Barbados, for green dressing purposes, and a sample plant has been analysed at the Government Laboratory of the island.

From the statement of analysis, it appears that the total weight of the crop per acre (1,210 holes) was 6,655 lb., containing 2,323 lb. (34·91 per cent.) of organic, or humus-forming, material. The amount of nitrogen added to the soil by the crop is shown to be 33·3 lb. per acre, of phosphoric anhydride 21·3 lb., and of potash 53·2 lb. per acre.

A better idea of the actual value of castor oil plants for green manurial purposes will be obtained on comparison of the above figures with those relating to various leguminous crops grown for the same purpose in experiments carried out at Waterford plantation by the Imperial Department of Agriculture in 1900.

The crops under trial included woolly pyrol, cowpeas and Bengal beans. While as already mentioned, the amount of organic matter yielded by the castor oil plants was 2,323 lb., that added to the soil by green woolly pyrol was 2,069 lb., by cowpea vines 2,730 lb., and by Bengal beans 3,962 lb. The great difference, as might be expected, lies in the amounts of nitrogen incorporated into the soil as the result of cultivating castor oil plants and leguminous plants such as the above. While the castor oil crop contained 33·3 lb. of nitrogen per acre, the woolly pyrol crop yielded 48 lb., the cowpeas 70 lb., and the Bengal beans 120 lb. In the case of the leguminous crops, too, a considerable quantity of this nitrogen would be obtained from the atmosphere, while the castor oil plant merely returns to the soil what it has previously taken from it.

Malaria at Mauritius.

The prevention of malaria in Mauritius forms the subject of an important report recently prepared for the Colonial Office by Major Ross, F.R.S., who lately paid a visit of three months to the colony.

Some idea of the prevalence of malaria in Mauritius may be gained from the facts that of 31,022 school children examined for the purpose, more than one-third were found to have their blood infected with the parasites causing the disease; that the number of deaths due to intermittent fever amount to 31 per cent. of the total; and that the annual cost of the disease to estate owners in the island is estimated to reach £43,300 in loss of labour, and to the labourers themselves £10,000 yearly in loss of wages.

In the course of his report Major Ross sets out, under ten different heads, the details of a definite scheme of action which he has formulated for dealing with malarial fever in the colony. The most important measures included in this scheme are the periodical examination of children in schools and on estates for the discovery and treatment of those already infected, continuous house-to-house distribution of quinine, and the steady carrying out of various works, described respectively as 'major' and 'minor,' for the improvement of drainage, the destruction or filling up of pools in which mosquitos can breed, and the destruction of larvae. The cost of carrying out the recommendations is estimated at about £9,000 per annum.

◆

Sweet Potato Weevil at Barbados.

The best methods for dealing with the sweet potato weevil ('Scarabee' or 'Jacobs'), attacks from which have been unusually prevalent at Barbados this year—a fact generally attributed to the dryness of the season—formed the subject of a paper read before a recent meeting of the Agricultural Society of the island by Mr. H. A. Ballou, M.Sc., Entomologist to the Imperial Department of Agriculture.

It was pointed out that one of the first points to receive attention, when a crop was attacked, should be the destruction of all infected potatos, either by burning, boiling, or burying with lime. In clearing a field of a sweet potato crop, it is important (whether the plants are infested or not) to clean up all pieces of vines and roots, so that no food supply whatever is left for the weevils. If pieces of potato are put down in heaps at frequent intervals, these serve to attract the pests, which may then be collected and destroyed—by dropping into a can containing water and kerosene. Small heaps of trash lying about also serve as hiding places for the weevils, and if these are burnt up after a while, numbers of weevils would almost certainly be destroyed. If it were practicable, it would probably be effective to trash any badly infected field, and burn it over.

Another point which should receive attention is the establishment of a suitable rotation of crops on land known to have been infested with the weevil. It would naturally be most unwise to grow sweet potatos twice in succession on the same land. It is important, too, that the crop should be gathered immediately it is ripe.

INSECT NOTES.

Diptera.

(Concluded from the last issue of the *Agricultural News.*)

The family Muscidae includes the house-flies, the flesh-flies, and the parasitic Tachina flies.

The common house-flies (*Musca domestica*) are extremely abundant and very important. They are world-wide in their distribution, and are important factors in the distribution of certain diseases, such as typhoid fever. The eggs of the house-fly are laid in horse manure or other excrementitious or decaying matter. The eggs hatch in a few hours, and the larvae become full-grown in five or six days, and after about five days in the pupal stage, the adult fly emerges. The best means of controlling this insect is by doing away with its breeding places. All decaying matter and filth should be kept cleared away, and horse manure should be removed from stables regularly at periods of not more than four to five days.

The Muscidae also include the blue-bottles and blow-flies. The most important of these in the West Indies is the species known as the Screw worm (*Compsomyia macellaria*), which a few years ago was so abundant in St. Lucia. This insect is especially dangerous on account of the habit of depositing eggs in sores or wounds in the flesh of man and beast, and sometimes in the nasal passages of domestic animals and human beings. In a pamphlet published by the Imperial Department of Agriculture (Pamphlet Series No. 14) the life-history of this fly is given, with an account of its attacks on domestic animals at St. Lucia, and of the remedial treatment that should be employed in case of attack.

The Tachininae or Tachina flies are parasitic in their habit, attacking caterpillars and other insects. The eggs are attached to the skin of the host insect, and the maggots burrow through the skin, and live on the body contents. The host is entirely devoured, and instead of a moth or butterfly developing from such a parasitized insect, a considerable number of Tachina flies is obtained.

It may be due to flies of this group that the potato worm, which sometimes seriously attacks the leaves of sweet potatos in these islands, is so completely checked.

The Sarcophaginae are the flesh-flies, the larvae of which live in or on flesh. One of these, *Sarcophaga trivittata*, attacks the cotton worm.

The Siphonaptera or Fleas.

The small insects known as fleas are blood-sucking parasites which were until recently classified as a family of Diptera. Of late years, they have more often been given the rank of a natural order under the name of Siphonaptera. About 150 species are known, and these are parasites on man, and on dogs, cats, and fowls among the domestic animals, and on rats and a number of other wild animals.

The fleas are wingless; the body is compressed laterally; the mouth parts are adapted for piercing and blood-sucking. The hind pair of legs are developed specially for jumping.

The head of the fleas is small, and the body is set with stiff hairs. The larvae are small, slender and footless, but on account of the shape of the head, are more like beetle grubs than the maggots of the Diptera.

Most people are familiar with the appearance of the adult fleas, but very few know the larvae. They seem to live on dry vegetable dust and on organic waste matter, and the length of life of the larvae seems to vary under different conditions. In the case of the cat and dog flea, which is one of our commonest species, it has been stated that the larval stage varies from one to two weeks, while the whole life cycle from the deposition of the egg to the appearance of the adult is sometimes completed in a fortnight.

The jigger flea (*Sarcopsylla penetrans*) is fairly common in the West Indies, and in other tropical and subtropical places. This is the flea which burrows into the skin. It attacks many domestic animals, and is said also to attack birds. These fleas attack man generally about the feet, and the swellings, produced as a result of the irritation caused by the insect and by the swelling of the body of the flea in which the eggs are developing, are very painful, and sometimes produce serious results. Whenever these insects are discovered in the skin they should be removed at once, and great care should be exercised not to burst the body of the insect allowing the eggs to escape. (See *Agricultural News*, Vol. VI, p. 170.)

The house flea (*Pulex irritans*) attacks man, and is known in all parts of the world. In some countries it is a serious pest. The eggs of this insect are deposited in the dust on the floors of houses, or under carpets, mats, etc. The eggs of the cat and dog flea (*Pulex serraticeps*) are deposited among the hairs of an infested animal. These drop to the floor and hatch there, and the larvae live among the dust and organic particles in the same way as the house flea.

A considerable amount of interest attaches to fleas on account of the recent discovery that these insects are responsible for the transmission of plague. It has generally been stated that the rat flea is the carrier of plague from the infected rat to the human victim, but recent experiences seem to indicate that other species may be as much concerned as the rat flea. During the recent occurrence of plague in San Francisco, fleas were collected in the plague laboratory and hospital, and in the refugee camps.

The following statement is quoted from an article: 'Notes on Fleas collected on rat and human hosts in San Francisco and elsewhere' by R. W. Doane, Stanford University, California, which appeared in the *Canadian Entomologist* for August last:—

'A study of these records shows that *Loemopsylla cheopis*, which is known as the plague flea in countries where the disease is epidemic, is well established in San Francisco, and is spreading to neighbouring cities. Doubtless a search would reveal it in many localities. It is interesting to note that out of the 672 fleas taken from the human beings, some of them persons who were sick, or had died of the plague, from attendants in the hospitals, and from men engaged in catching the rats, not a single *Loemopsylla cheopis* was found. On the other hand, *Pulex irritans*, which is the most common of the human fleas, has been found quite abundantly on rats. One lot sent from Dr. Rucker contained eighty-one specimens of *P. irritans*, and no other species. These were collected from eighteen rats taken in houses and sewers in infested districts.'

In view of the fact that plague is now known to occur in the American tropics, great care should be taken to prevent fleas from becoming too numerous in houses. The free use of pyrethrum on dogs and cats, and on the floors, especially where these animals sleep, would be very useful in this connexion. Floors should be frequently and thoroughly swept, carpets and rugs should be taken out and aired and beaten at frequent intervals. In a recent number of the *Agricultural News* (Vol. VII, p. 13) two flea remedies are given. In one of these the free use of pulverised alum is recommended, and in the other the use of soap suds in a plate on the floor, with a flame burning in the middle. The flame attracts the fleas, and they fall into the soap suds and are killed.

STUDENTS' CORNER.

Introductory.

It is proposed to devote a small space in each issue of the *Agricultural News* to matters relating to the Reading Courses in Agriculture which have lately been established in the West Indies (see *Agricultural News* of July 11 last, p. 209; also August 22 last, p. 267) and the examinations to be held in connexion with them. In this space there will be put forward hints and suggestions concerning the various objects of study and observation together with questions which students should endeavour to answer. Notes on seasonable events of agricultural importance in the different colonies will also be a frequent feature in this column.

As the work to be done by various students in the several colonies covers a great deal of ground it is not expected that each student will be able to answer every question, but he should, with the aid of his books, work out the answers to such as deal with the work he has in hand.

The answers to the questions are *not* to be forwarded to the Editor of the *Agricultural News*, who cannot undertake to revise them. It would, however, be well if students could find, at various centres in the different colonies, persons who would assist them in their studies and correct their answers to the questions. In any case it would be of advantage if the students of a district were to meet together at regular intervals for mutual intercourse and guidance.

From time to time attention will be directed to books of interest to students. Students must not think that it is necessary for them to purchase every book referred to: each student should have a few books which he studies thoroughly and carefully. Other books are very useful for reference and it is well to know of their existence. Many books of reference can be seen and consulted at the central agricultural station in each island or colony, and students should acquire the habit of referring to these regularly.

Below are given a few notes (prepared by Dr. Francis Watts, C.M.G.), in which the attention of students is drawn to the agricultural operations in progress on the land during the month of September.* These will be followed in the next issue of the *Agricultural News* by notes dealing with agricultural work usually conducted in the month of October. Similar notes discussing points of topical interest will appear in each succeeding number of the *News*.

Following the notes are given a series of six questions. Three of these are suitable for students preparing for the Preliminary examination, while the second three are intended for students entering on the work for the Intermediate examination. Questions of this type will be continued in each issue:—

Seasonal Notes.

SEPTEMBER.

1ST FORTNIGHT.

The period has arrived when the fields are being prepared for sugar-canes. Students should note the character of the soil as it is turned up by the ploughs, forks or hoes. The depth to which these implements turn up the soil should be accurately measured. The character of the subsoil should be noted. Note what is done with the old cane stools and to what extent the old stools are affected by root disease.

In the cotton fields young cotton will be growing; note the manner of growth of a cotton root and compare it with a cane root. Observe the manner in which cotton seed germinates and what becomes of the cotyledonary leaves.

2ND FORTNIGHT.

Preparation of land for sugar-cane is in progress. Pen manure is being applied. Note how much manure is given per acre. Endeavour to ascertain either the number of cubic feet or the weight. Note what materials are used to produce the manure. Note whether the manner in which manure is prepared or stored renders it liable to loss or waste.

In the cotton fields, note whether any plants are growing which differ in appearance from others and what is the nature of any differences that may be evident; note whether these flower before or after the others, and when the bolls are ripe, whether the lint is better or worse in quality.

PRELIMINARY QUESTIONS.

(1) What is the atmosphere, and of what is it composed?

(2) Write a short account of Carbon Dioxide, and the part it plays in animal and vegetable life.

(3) Describe the changes which take place on cooling and heating water, giving brief accounts of the properties of ice and steam.

INTERMEDIATE QUESTIONS.

(1) What purpose is served by the breaking up of the soil in cultivation?

(2) How is water retained in soil, and how does this admit of the simultaneous presence of air and water?

(3) How is air-space in a soil related to the fineness of the particles?

FUTURE RUBBER PRODUCTION IN THE EAST.

A note in a late issue of the *India-rubber Journal* discussed the possible output of rubber that may be expected from the plantations of Ceylon and Malaya in the course of the next ten years or so.

At present an area of about 350,000 acres has been planted with rubber in the East. Estimating the possible return on the low basis of 1 lb. per tree at eight or ten years old, at least 17,500 tons of plantation rubber would be turned out in 1918. On some estates in Ceylon, however, plantations at this age yield an average return of 2 lb. or even more per tree per annum. At this rate a crop of from 35,000 to 40,000 tons per year would be expected from the plantations of the East, ten years from now. This quantity represents about one-half the present rubber production of the world. Taking into account shortage of crops, badly developed estates, ravages of disease, etc., it would be reasonable to place the anticipated output of 1917-8 at about 25,000 tons

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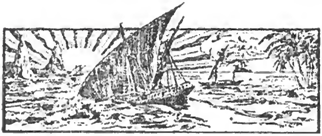
*Owing to unavoidable delay it was not found possible to publish the notes relating to September work in the numbers of the *Agricultural News* issued last month, as originally intended. After the next issue, however, the notes will be brought up to date.



GLEANINGS.

The Agricultural Superintendent of Grenada writes that a pot specimen of *Peristeria elata*, a ground orchid from Panama, is now in flower for the first time at the Botanic Station, Grenada. This plant has been placed temporarily on exhibition at the Public Library, St. George's.

The 1907 vanilla crop of the Seychelles Islands was a record one. It reached 1,460,932 lb., and was valued at £66,460. The price obtained for the product was also good, being about 10*s.* per lb., as compared with 4*s.* per lb., the average price last year.(*Annual Report, 1907.*)

A first edition, amounting to 360,000 copies, of the *Yearbook* for 1907 of the United States Department of Agriculture has lately been issued. It is expected, however, that the ultimate demand for this useful and interesting volume will reach 500,000 copies. (*New York Times.*)

Professor N. L. Britton, Director of the New York Botanic Gardens, has recently been paying a visit of botanical research to Jamaica, with the special object of collecting specimens of ferns, rare orchids, and other plants growing in the island.

From the plot of spineless lime trees at the Dominica Botanic Station a crop of 26 barrels of fruit was obtained in 1906-7, and 29 barrels in 1907-8. The plot which consists of twenty-eight trees planted at distances of 12 feet by 12 feet, has received a mulch of leaves each year in the dry season.

A Barbadian cow, which had just given birth to its third calf, was in August last purchased for the Stock Farm at the St. Vincent Agricultural School. During the period from August 3, 1907, to March 31, 1908, this animal yielded 773·12 gallons (7,731·2 lb.) of milk, which is generally regarded at St. Vincent as a surprisingly good quantity.

The *Demerara Chronicle* mentions that steps are being taken by some East Indian rice farmers in the colony to purchase land for the erection of a co-operative rice mill at Mahaicony. In this way the rice growers concerned would mill their own paddy and thus secure the profits which now go to the large milling concerns.

The prize list has been received of an Agricultural Exhibition to be held at Nassau, Bahamas, from February 24 to 26 (inclusive) of next year. There are nine classes in which prizes, ranging in value from £1 to 2*s.*, are offered for fruits, ground provisions and other vegetables, meals and starches, preserves and honey, sisal fibre, tobacco, cotton, salt, and manufactured articles.

The number of indentured East Indian coolies in Jamaica on March 31 last was 2,832. This section of the population appears to be in a flourishing condition, as the East Indians together own 8,415 acres of land, with houses, the value of their property being £43,550, and of live stock £6,992.

The amount of balata shipped from the North-Western District of British Guiana for the year 1907-8 was 153,532 lb., as against 149,342 lb. exported in 1906-7. The rubber exports however fell from 1,638 lb. in 1906-7, to 944 lb. in 1907-8. Small farmers in the district are reported to be planting the native rubber trees (*Sapium* spp.) on their lands in considerable quantity.

The *Port-of-Spain Gazette* mentions that the quantity of bananas exported from Trinidad during the twelve months ended June 30 last reached 61,386 bunches, as against 24.551 bunches exported in the previous twelve months. The increase is very satisfactory, although it is stated that the quantities shipped are not yet sufficient to fill the cold storage accommodation provided on the Royal Mail Company's steamers.

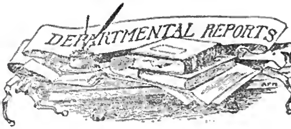
The imports of sugar into the United States from foreign countries for the twelve months ended June 30, 1908, amount to 1,686,000 short tons (of 2,000 lb.) valued at over $80,000,000. This quantity does not include the sugars received from Hawaii or Porto Rico. Cuba stands first on the list of countries furnishing the imports, and from that island 1,155,000 short tons were received. Java came second with 345,000 tons. (*Louisiana Planter.*)

Mosquito destruction is being carried out in a most thorough manner in Cuba. A recently issued report of the chief sanitary officer of the island states that in Havana, mosquito breeding has practically been brought to an end, since larvae were found in only one house out of 450 inspected. Similar good results are reported from other provinces.

A crop of 2 tons 18 cwt. of provisions, consisting of yams, potatos, tanias, peas, and bananas was produced on the land cultivated in connexion with the Dominica Agricultural School in the 1907-8 season. These provisions were consumed at the school, and enabled a saving of £27 2*s.* 8*d.* to be made on the vote for the year.

Practically all the estates in British Guiana were reported to be busy making sugar early in October. The canes, however, were found to be drier than was anticipated, and yields are more or less disappointing. Returns vary from 1·15 lb. of sucrose per gallon of juice (75 per cent. purity) to 1·40 lb. sucrose (85 per cent. purity) per gallon. (*Demerara Argosy.*)

As mentioned in the *Agricultural News* of September 23 last (page 284), the fact that the Italian Government propose to put a tax on lemon products exported from the country has given rise to the hope in some quarters that this action may result in a considerable advance in the price of citrate of lime on the English market. Mr. E. A. Agar, of Dominica, writes to point out, however, that since this tax amounts to no more than about 2*s.* 1*d.* per hogshead of concentrated lime juice, and is only to be imposed under certain conditions, it is hardly likely to have much effect on the selling price of citrate of lime.



DOMINICA : REPORTS ON BOTANIC STATION, EXPERIMENT PLOTS AND AGRICULTURAL SCHOOL, 1907-8.

The total amount expended in connexion with the Botanic Station during the year was £785 8*s*. Of this sum £430 was provided by the local Government.

The receipts from the sale of plants, seeds, and of produce amounted to £362 8*s*. 6*d*., an increase of £110 4*s*. 7*d*. over the receipts of 1906-7. There has, however, been a large decrease in the number of plants sent out. While in 1906-7, the total number distributed was 83,505, it has fallen to 53,855 in the past year. The falling off is chiefly noticeable in the case of lime plants, and is in large part due to the fact that several private nurseries have lately come into existence which are helping to meet the local demand for seedlings.

Good progress has been made in grafting cacao during the year. There are now 156 grafted plants at the Station, and in addition 146 have been distributed to various estates for trial. The yield of cacao obtained in the past year from trees at the Station reached 70 cwt. 14 lb., and was the largest crop on record, being 9½ cwt. in excess of the yield of 1906-7. The report on the manurial experiments with cacao, which are carried on both at the Station and in country districts, is very full, and contains a large amount of data which should be of the utmost interest to cacao growers, as indicating the methods of treatment which are likely to give the best returns. Four additional plots, for manurial experiments with this crop were started at the Station during the year.

Experiments with spineless limes are still in progress and the demand for this variety of plant continued steady throughout the year. The advances made in the manufacture of citrate of lime are indicated by the fact that the exports of this article rose from 728 cwt. in 1906 to 2,388 cwt. in 1907.

Seedlings of Para rubber (*Hevea brasiliensis*) for sale to planters have been raised at the Station, and samples of rubber, both of this kind, and from Castilloa trees, were prepared and sent to London. The Para product was valued at 4*s*. 2*d*. per lb. and the Castilloa rubber at 4*s*. per lb.

There are now nineteen boys at the Agricultural School. The expenditure on this institution during 1907-8 was £511 0*s*. 7*d*., while a sum of £42 4*s*. 2*d*. was derived from the sale of plants, poultry, and honey.

The land under cultivation in connexion with the school is from 12 to 14 acres in extent. Part of this is planted with permanent crops as limes, cacao, oranges, etc., while the remainder is under temporary cultivation with such crops as ground nuts, bananas, fodder crops and provisions. Nearly the whole of the cultivation work over this land is done by the pupils, and since up-to-date methods are employed, and the work includes practice in grafting, budding, pruning, etc., it constitutes a valuable part of the training of the boys.

Among the more interesting of the experiments in progress at the School are those with different varieties of fodder crops, with cacao, and with ground nuts.

The live stock kept at the School have been increased during the year by the addition of a pure-bred Toggenburg billy goat, a pure-bred Toggenburg nanny, and a half-bred Indian nanny with kids.

BRITISH GUIANA: ANNUAL REPORT OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE, 1907-8. By Professor J. B. Harrison, C.M.G., M.A., etc., Director.

The total expenditure in connexion with the several branches of this Department during 1907-8 was $40,212·77, or $3,188·23 less than the amount voted. Of this, the sum of $18,605·90 was spent on salaries of officers, travelling expenses, printing, etc. Agricultural experiments with sugar-cane, rice, rubber, etc., the purchase and maintenance of live stock, etc., cost $11,517·07 ; $9,453·65 were expended on the Botanic Gardens, and $636·15 in connexion with the Government Laboratory. A sum of $6,178·30, from Laboratory fees, sales of produce at Botanic Gardens, etc., was paid into the Treasury as the result of the working of the Department.

Science teaching work was carried on at Queen's College during the year by officers of the Department, and several boys entered, with success, for the Cambridge Local Examinations in Chemistry in December 1907.

Practical agricultural teaching in connexion with public elementary schools is now solely under the control of the Department of Science and Agriculture. As a result of this new arrangement, the Model School Gardens at Georgetown, New Amsterdam, and in various country districts have been placed under the superintendence of one officer. It is reported that the condition of the gardens, and the attendance of children at them have since shown great improvement. Arrangements have also been made for regular courses of lectures in Agricultural Science to be given to masters in Elementary Schools in the colony.

A geological hand-book of British Guiana, containing a map and views of the colony, was completed by Professor Harrison during the year, and will shortly be issued.

Rubber-yielding plants, principally *Hevea brasiliensis*, *Sapium Jenmani*, and *Funtumia elastica* have been planted during the year at the Experiment Station in the North-Western District. A profit of $686·92 for the financial year was made on the working of the Onderneeming Industrial School, where experiments are being carried out with cacao, coffee, rubber, etc.

DEPARTMENT NEWS.

It has been announced that Sir Daniel Morris, K.C.M.G., will retire from the post of Imperial Commissioner of Agriculture for the West Indies on November 30 next.

Mr. H. A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, accompanied by Mr. C. W. Jemmett, sailed for the Northern Islands by the C.L.S. 'Dahomé' on October 30. Mr. Ballou will visit Antigua, Montserrat, and St. Kitt's-Nevis, for the purpose of investigating the insect pests in connexion with cotton and other industries in the different islands, and is expected to be away from Barbados for about a month.

CHEESE MAKING IN CUBA.

An interesting and illustrated bulletin dealing with cheese making in Cuba has lately been issued by the Central Experiment Station of the island.

The manufacture of cheese, at least on anything but a small scale, is not an industry that one readily associates with tropical conditions. Usually the product can be imported more cheaply than it can be produced locally, while fresh milk can generally be disposed of to consumers at so satisfactory a price that there is no temptation to utilize it in any other way. The risk of loss entailed by daily handling large quantities of a product so perishable as milk in a hot climate would also have to be taken into consideration by intending cheese-makers, but probably the chief obstacle in the way of the establishment of an industry of the kind in most parts of the West Indies would be the want of proper facilities for providing a suitably low temperature for ripening the manufactured product.

The particulars given in the bulletin mentioned, however, show that soft cheeses and small hard cheeses are being made successfully in fairly large quantity on many farms in Cuba all the year round. Near Havana and other towns in the island milk sells readily at 6*d*. to 7½*d*. per quart, but on farms distant from town, and where there is no easy means of transport, the product is made into various kinds of small cheeses.

Those interested in the possibilities of cheese making in the West Indies will find in the bulletin full details as to apparatus required and its cost, the methods of procuring and using a 'starter' (i.e., a quantity of milk known to contain the right kind of bacteria for producing the proper fermentation when a small portion of it is added to the milk that is to be made into cheese), and of determining the 'ripeness' of the milk, or the point at which it has reached the proper degree of acidity for the rennet to be added. Descriptions are also given of the processes of cutting, cooking and salting the curd, drawing off the whey, and of putting the curd into the press, in making hard cheese. Other details relate to the manner of making rennet, or (what is advised in preference) the purchase of rennet tabloids from a dealer in dairy supplies, the curing and dressing of cheese, and the manufacture of soft, cream, and skimmed milk cheeses. Stress is laid upon the fact that to attain success every care must be taken to ensure the utmost cleanliness at every stage of the work.

The following account of a short and simple process for making a small hard cheese (as distinct from the factory process, which is described in full detail), is given in the bulletin and may be of interest:—

Take 20 quarts of milk, consisting of 15 quarts of fresh morning's milk, and 5 quarts from the yield of the evening before, stirring the latter well, so as to mix the cream. Heat the whole volume of mixed milk to a temperature of 86° F. (30° C.) and add one No 2 Hansen's prepared rennet tabloids (to be obtained of any dealer in dairy supplies and equipment) dissolved in a cup of cold water, together with a tablespoonful of salt, the whole to be thoroughly mixed with the milk.

Let the milk stand until the curd is well-formed, then cut or break the curd up thoroughly and stir for five minutes to separate the curd from the whey. Let it stand for ten minutes, then pour off the whey and place the curd into a clean cloth sack, and hang it up to drain for half an hour. Remove the curd and cut into cubes ½ inch square, then add two tablespoonfuls of fine salt, sprinkling it over the curd, and mix well. The curd can be pressed in a 1-gallon tin pail, that has a few holes punched in the bottom. The pail should be lined with a piece of cheese cloth well greased with fresh butter or lard. Put a 50-lb. weight on the cheese and leave for twenty-four hours, then remove the cheese, trim and grease with fresh butter or lard, and put in as cool a place as possible, turning the cheese daily.

The cheese will be cured in three weeks, but will improve with age up to three months.

THE 'LOVE VINE.'

The creeper known as the 'Love Vine' ('L'amitié') a species of *Cuscuta*, is well known in all the West Indian Islands, and is a most destructive parasite.

An editorial article in a recent number of the *Port-of-Spain Gazette* draws attention to the increasing prevalence of this pest in all parts of Trinidad, and from the particulars given, it would appear that it has been allowed to spread in that island to an alarming degree, and is lately reported to have been noticed on cacao trees in a few instances. Two or three years ago (see *Agricultural News*, Vol. III, p. 185) the love vine became such a menace to the agricultural interests of Trinidad that steps were taken to deal with the matter by legislation. Powers were given to the Chief Inspector under the Agricultural Protection Ordinance to call upon owners of land infested with 'love vine' to destroy the parasite by burning or burying, while provision was made for the punishment of proprietors neglecting to carry out this order by the imposition of fines. Apparently, however, there is still needed a good deal of energetic co-operation among cultivators in Trinidad to keep this pest under control.

The *Cuscuta* genus of plants belongs to the order Convolvulaceae. There are about eighty species of *Cuscuta* known to science, all of which are parasitic on other plants. They possess no chloroplasts, and are therefore unable to take up carbon dioxide from the air like ordinary green plants, but attach themselves by means of root-like suckers to various host-plants, from which they extract ready-made food products. As a natural result, the host becomes exhausted, and ultimately dies. A species of *Cuscuta* well-known in Great Britain is *C. trifoli*, the 'clover dodder.'

The 'love vine' and other species of *Cuscuta* produce seeds which fall to the ground and germinate in the usual way. As soon, however, as the young shoot comes into contact with another growing plant, it twines itself around this, which becomes the host, and the root of the parasitic plant dies out. The 'love vine' is also readily reproduced by vegetative means, as small portions thrown on another plant are able to attach themselves and give rise to another mass of tendrils.

It will therefore be understood that to thoroughly eradicate the pest needs the most unremitting labour and attention. Special care should be taken to prevent the vine from forming seed, and therefore whenever the greenish rosettes of flowers make their appearance, the work of destruction should no longer be delayed under any circumstances. Every portion of the creeper should be picked off and either burned, or buried deeply with lime.

In a leaflet issued some four years ago by the Botanical Department of Trinidad, it is pointed out that even after infested land has been cleared as thoroughly as possible of the parasite, it should receive a visit of inspection at least once a week, in order that every remnant which can be seen may be removed.

SEED SELECTION AND THE BREEDING OF PLANTS.

The above subject is discussed at considerable length and in an interesting manner in an article by Mr. A. D. Shamel, which appears in the *Yearbook* for 1907 of the United States Department of Agriculture. The question of the improvement of agricultural crops by seed selection and breeding is one of great importance to all concerned, for it usually costs no more to grow improved varieties of crops than unimproved kinds, while the increase in production which results from the use of superior seed gives an additional profit. During the past ten or fifteen years this subject has attracted a good deal of attention.

As pointed out in the article under consideration, a primary reason for interest in the possibilities of this line of work lies in the fact that where the same varieties of crops have been grown year after year on the land of a given district, and no seed selection practised, or efforts at judicious breeding made, these varieties tend to deteriorate and become unprofitable. Fungus and insect enemies also frequently develop under these conditions, and these help to bring about a still further reduction of the commercial returns. This, it may be pointed out, has already been experienced with the Sea Island cotton crop in the West Indies, and the seed selection work constantly advocated and practised by the officers of the Imperial Department of Agriculture forms the chief means at the planter's disposal for keeping up and increasing his crop returns, as well as of producing a strain of plants which shall be, to a large extent, immune to insect and fungoid attacks.

The following extracts from the article referred to relate to possible improvements that may be made with maize and cotton by seed selection work. To obtain success, however, such work must be long-continued and carried out with skill. The type of plant required must be chosen, and seed selection constantly practised with the object of fixing this type:—

The most important field for the breeder's work is in the improvement of the established varieties of crops by the production of strains approximating more uniformly to the best types of these varieties. This lack of uniformity in high productive capacity is responsible in great measure for the present low average yield of most of our crops in the United States. It is due to the variability of the plants of these varieties, which is more evident in the cross-fertilized crops than in the self-fertilized ones. In the case of corn this variability of plants is particularly striking. It is the experience of most corn breeders that it is not possible to produce on an acre more than 5 bushels of uniform ears even of our most improved strains. A large majority of the plants produce ears of small size, irregular shape, and light weight. Many of the stalks are barren. Only a small proportion of the plants produce the maximum size and weight of ear. In the cornfields of the central Mississippi Valley the corn is usually planted in hills, 3 feet 6 inches apart in the row. The rows are arranged 3 feet 6 inches apart, and the hills checked so as to permit cross cultivation. This arrangement provides for 3,556 hills to the acre. An average of about 3 kernels is planted in every hill. If every kernel produced a uniform plant and the plants bore uniform ears weighing 1 ℔. each, the yield per acre would be about 10,668 ℔., or about 155 bushels of shelled corn per acre. The fact that the average yield of this section is less than 40 bushels per acre is striking evidence that only a small proportion of the plants bear ears of the maximum weight.

A great deal of this variability and lack of uniformity of the corn plants can be overcome by systematic selection of the best seed ears year after year, and the propagation of this seed alone, so that there is no danger of crossing with the undesirable types of plants or inferior varieties of corn. This fact has been fully proved in the production of varieties by many years of continued selection of the seed which has been found to be more productive and profitable for culture than the unselected or unimproved sorts. The gradual increase in yield of corn in Illinois, Iowa, and other great corn-growing States during the past ten years can safely be attributed in no small degree to the use of the improved varieties produced in these sections by breeders.

The cotton crop of the United States, which approximates to 12,000,000 bales is produced on about 30,000,000 acres. The average yield, therefore, is less than ½ bale per acre. This low average yield is due in part to the fact that a majority of the plants of the varieties now grown do not produce a yield equal to that of the best plants in the fields. The variability of the cotton plants in respect to the amount of cotton borne by the individual plants is almost as marked as the variability of the corn plants. Not only is there great variability as respects the yield of cotton from individual plants, but there is a corresponding variation in the character of the lint borne by the different plants. It is the opinion of many of the most successful growers that if the cotton varieties now grown were improved so that the plants conformed more closely to the standards of the best plants in the fields, the yield of cotton from these varieties would be doubled without much additional expense in the cost of production.

CACAO SHIPMENTS FROM TRINIDAD.

Particulars as to the quantity of cacao exported from Trinidad, in September last, and the countries to which it was shipped appear in the latest number of the *Proceedings* of the Agricultural Society of the colony.

The total quantity exported during the month was 708,013 ℔., which brings up the shipments already made since January 1 last, to 35,471,115 ℔. This refers only to cacao which is the produce of the island. The quantity of Trinidad cacao exported in the nine months ending September 30, 1907, was 31,308,624 ℔.

In the list of countries to which the cacao shipments of the past month were consigned, the United States comes first, that country having taken 304,751 ℔; France imported 271,811 ℔. of Trinidad cacao in September, and takes second place, while Germany comes third with 59,200 ℔., and the United Kingdom fourth, with 23,451 ℔. London quotations for Trinidad cacao varied from 64*s*. on September 1 to 60*s*. on September 30.

A tabular statement also shows particulars of the exports of Trinidad cacao each year since 1904. In that year the shipments were nearly 50½ million pounds; in 1905 they dropped to 48½ million pounds; and in 1906 there was a much greater fall, the shipments being little more than 28½ million pounds. Last year they reached over 41 million pounds, and there is every promise of that figure being exceeded by the exports of 1908.

MARKET REPORTS.

London,—October 13, 1908, The West India Committee Circular; Messrs. Kearton Piper & Co., October 13, 1908; Messrs. E. A. de Pass & Co., October 2, 1908.

Arrowroot—Quiet; no quotations.
Balata—Sheet, 2/- to 2/3; block, no quotations.
Bees'-wax—Good quality, £7 10s. to £7 15s. per cwt.
Cacao—Trinidad, 56/- to 70/- per cwt.; Grenada, 48/- to 58/- per cwt.
Coffee—Santos, 25s. 4½d. to 25s. 6½d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £17 10s. per ton.
Cotton—St. Vincent, and Barbados, 14d.; West Indian, good medium, 6·20d.; West Indian Sea Island, good medium to medium fine, 14d. to 14½d.; fine, 15d.; extra fine, 17d. per lb.
Fruit—
  Bananas—Jamaica, 4/6 to 5/- per bunch.
  Limes—Unsaleable.
  Pine-apples—Antigua, no quotations.
    St. Michael, 1/9 to 4/6 each.
  Grape Fruit—17/- to 19/- per box.
  Oranges—Jamaica, 8/- to 9/- per box.
Fustic—£3 10s. to £4 10s. per ton.
Ginger—Quiet.
Honey—Dull gray to good grayish, 23s. 6d. to 26s. 6d. per cwt.
Isinglass—West India lump, 2/2 to 2/4 per lb.
Lime Juice—Raw, 11d. to 1/3 per gallon; concentrated, £16 per cask of 108 gallons; distilled oil, 1/2 per lb.; hand-pressed, 4/3 to 4/6 per lb.
Logwood—£3 10s. to £4 10s. per ton; roots, no quotations.
Mace—Steady; no quotations.
Nutmegs—Steady.
Pimento—Quiet.
Rum—Jamaica, 1/8 to 7/6; Demerara, 1/6 per gallon; Trinidad, no quotations.
Sugar—Crystals, 15/3 to 16/6 per cwt.; Muscovado, 14/3½; Syrup, 9s. to 12s. 6d.; Molasses, no quotations.

New York,—October 16, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12½c. to 13½c.; Grenada, 12½c. to 13c.; Trinidad, 13c. to 13½c.; Jamaica, 10c. to 11c. per lb.
Cocoa-nuts—Jamaica, select, $28·00 to $30·00; culls, $17·00; Trinidad, $28·00 to $30·00; culls, $17·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c. to 8¾c.; washed, 9c. to 11c. per lb.
Ginger—10¾c. to 13¼c. per lb.
Goat Skins—Jamaica, 53c.; Antigua and Barbados, from 49c. to 50c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 47c. per lb., dry flint.
Grape Fruit—Florida, $4·00 to $5·00 per barrel; $2·00 to $2·75 per box.
Limes—No quotations. Market over-stocked.
Mace—28c. to 32c. per lb.
Nutmegs—110's, 9½c. per lb.
Oranges—Florida, $3·50 to $4·50 per barrel; $2·00 to $2·50 per box.
Pimento—2½c. per lb.
Sugar—Centrifugals, 96°, 3·98c.; Muscovados, 89°, 3·48c.; Molasses, 89°, 3·23c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., October 19, 1908; Messrs. Leacock & Co., October 24, 1908; Messrs. T. S. Garraway & Co., October 26, 1908.

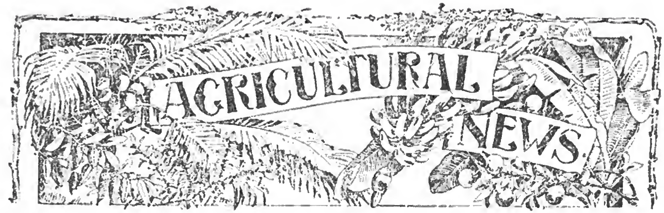
Arrowroot—St. Vincent, $4·50 per 100 lb.
Cacao—Dominica and St. Lucia, $13·00 to $14·00 per 100 lb.
Cocoa-nuts—$20·00 for husked nuts.
Coffee—Jamaica and ordinary Rio, $9·00 per 100 lb.
Hay—$1·25 to $1·50 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·50 to $3·00; loose, $2·00 per 100 lb.
Potatos—Dutch, $2·25 per 160 lb.
Peas—Split, $6·50 per bag of 210 lb.; Canada, $3·75 per bag of 120 lb.
Rice—Ballam, $5·08 to $5·70 (180 lb.); Patna, $3·80, Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, October 17, 1908; Messrs. Sandbach, Parker & Co., October 16, 1908.

Arrowroot—St. Vincent, $9·50 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—60c. to 80c.
Cassava Starch—$6·50 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb.
Dhal—$5·25 to $5·40 per bag of 168 lb.
Eddos—$1·96 per barrel.
Molasses—No quotations.
Onions—Madeira, 2¼c. to 2½c.; per lb.
Plantains—12c. to 24c. per bunch.
Potatos—Nova Scotia, $2·25 to $2·50.
Potatos—Sweet, Barbados, $2·16 per bag.
Rice—Ballam, $6·00 to $6·25; Creole, $4·80 to $5·00 for good; Seeta, $6·00.
Split Peas—$7·00 per bag (210 lb.); Lisbon, no quotations.
Tannias—$1·44 to $1·56 per bag.
Yams—White, $2·16; Buck, $2·40 per bag.
Sugar—Dark crystals, $2·15 to $2·25; Yellow, $2·80; to $3·20; White, $3·50 to $3·70; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
——Cordwood—$2·40 to $2·64 per ton.

Trinidad,—October 17, 1908.—Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·00 to $12·25 per fanega; Trinidad, $11·75 to $12·25.
Cocoa-nuts—Selected, $23·00 per M., f.o.b.
Cocoa-nut Oil—67c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. per lb.
Copra—$3·00 to $3·15 per 100 lb.
Dhal—$4·60 to $4·70 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $4·75 to $4·80 per bag.
Split Peas—$6·50 to $6·75 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.



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Minor Agricultural Crops of the West Indies.

WHILE the cultivation of sugar-cane, cacao, and cotton, together with fruit in such islands as Jamaica and Dominica, are likely to remain the chief agricultural industries of the West Indies, it should not be forgotton that there are a number of minor products—and this apart from such staple provision crops as sweet potatos and yams—which are well worthy of consideration as subsidiary sources of profit.

The minor crops of which special mention may here be made, include a number of vegetable products for which there is generally a regular, if somewhat small, local demand, and which from their nature are particularly adapted for cultivation on the holdings of peasant proprietors. It has frequently been demonstrated in the various islands that with care and attention a very substantial addition to the income of these small cultivators can be made by growing and retailing such crops as onions, beans, peas, cabbages, carrots, squashes, papaws, lettuce, tomatos, and ground nuts. Artichokes and English potatos have also been successfully produced in some of the West Indian Islands.

The possibilities connected with the more extensive cultivation of garden crops in many of the islands are fully recognized by the Agricultural Officers, as is evident from the number of experiments in this direction, particulars of which are given in the *Annual Reports* of the different Botanic Stations, etc.

In the past year a quantity of English vegetables, consisting of 117 lb. of turnips, 58 lb. of lettuce, 149 lb. of beet root, 164 lb. of kohl-rabi, and 103 lb. of carrots, were all produced on a plot of land no more than one-tenth of an acre in area, at the Grove Experiment Station, Montserrat. A portion of this produce was consumed locally, and six barrels of the vegetables were shipped to Antigua, where they realized the sum of £3 14*s.* 2*d.* In his report, the Curator of the Montserrat Botanic Station points out that the growing of this class of produce deserves more attention than it at present receives from the peasantry. In 1906 a crop of 213 lb. of tomatos was grown on 60 square yards of land at Harris' Station, Montserrat.

Promising results, too, have attended the production of vegetables on a small scale by the pupils of the St. Vincent Agricultural School. It is mentioned in the latest annual report on the school (1907-8) that there is a good demand in the island for such articles as beans, tomatos, lettuce, parsley and cabbage, and that it is an easy matter for a boy to realize $1·00 per month from the sale of lettuce alone.

Onions form a minor crop that has received considerable attention in many of the West Indian Islands, more especially at Antigua and Montserrat. It is a crop that is particular as to the nature and condition of the soil, and land on which onions are to be grown should always be in good tilth and well manured. Under average conditions the crop is easy to produce, although care is needed during the curing process, especially if it is intended to ship the produce to an outside market. The onion industry of Antigua has been under development during the past ten or twelve years, and is described as being distinctly lucrative, and capable of further extension. A quantity of the produce is consumed locally, but the great bulk is exported to other West Indian Islands, and to America. The value of the onion shipments from Antigua in 1906 was over £500. At Grove Station, Montserrat, in 1906, a yield of 12 barrels (or 1,672 lb.) of onions was obtained from a plot of land one-tenth of an acre in area. Eight of these barrels were shipped and realized £5 8*s*. 4*d*., the cost of cultivation, seed, etc. being £1 5*s*. 8*d*.

The possibilities of onion cultivation have also been under consideration both at Barbados and St. Kitt's-Nevis, and but for the increasing attention demanded by the developing cotton industry during recent years, it is probable that efforts would have been made to create a small export trade in this product from those islands. A good yield of onions was obtained at the St. Kitt's Botanic Station in 1906. The crop was considerably smaller in 1907, but still yielded a profit at the rate of £14 11*s*. 8*d*. per acre. At Nevis, about 1,100 lb. of onions were gathered from a plot one-tenth of an acre in area, and in his latest report, the Agricultural Instructor speaks of the cultivation as being one of the most promising of the small industries of the island.

Cabbage growing has of late years been encouraged at St. Lucia by experiments in this cultivation carried out at the Experiment Station in the island. The kinds which have given most success are 'Succession' and 'Autumn King.' These are ready for cutting in about three months from sowing. The supply of cabbages on the St. Lucia market has much improved both in quantity and quality as the result of this experimental work. Similar efforts are also being made to extend cabbage cultivation at Montserrat.

Beans and peas are articles of produce to which attention may always profitably be given by small cultivators in the West Indies, as the market for this class of vegetable is regular and certain. At most of the Experiment Stations in the different islands experiments are in progress with different varieties, in order to demonstrate the best methods of cultivation and the yields of beans and peas that may be expected, as well as to raise seed for distribution. It should not be forgotten in connexion with these crops, that being leguminous plants, their cultivation results in an enrichment of the soil with nitrogen.

This latter consideration applies, too, to the ground nut crop, which belongs to the same order, and is also a nitrogen gatherer. Attention has frequently been drawn in the *Agricultural News* to the value of the ground nut as a suitable crop for small holders in the West Indies. With the object of encouraging the cultivation of the best kinds, seeds of two improved varieties, viz: 'Dixie Giant' and 'Tennessee Red' were imported from the United States by the Imperial Commissioner of Agriculture during the past year. These seeds, which are much larger than the local kinds of nuts, have been distributed to the various Experiment Stations for trial.

Other minor crops which are to be seen in the gardens of occasional cultivators, and which might be grown more often, in quantity at least sufficient to supply the home need, are beet-root, pumpkins, peppers and ginger, etc.

Bananas must be considered a minor product in all of the West Indian Islands, with the exception of Jamaica. Attention need hardly be drawn to the value of a fruit so universally grown and appreciated in the West Indies, but it may be pointed out that there are many odd corners on numbers of estates, more especially if well sheltered, where one or more banana plants could easily be grown, with no trouble beyond planting the original suckers. If distance from a market prevents the profitable disposal of the produce, it should not be forgotten that green bananas, when chopped fine, form a palatable and nutritious addition to the rations of calves and other growing live stock.

SUGAR INDUSTRY.

Sugar-cane Cultivation in Cuba.

Professor F. S. Earle, Director of the Cuban Agricultural Experiment Station, in his book 'Southern Agriculture,' a notice of which appears on page—of this issue, deals at considerable length with the systems of cane cultivation which are adopted in different countries. In reference to Cuba it is pointed out that planters are passing through a transition period in regard to the methods of cultivation practised. An account is given of the system recommended by the Experiment Station to cane cultivators in the island, a summary of which may be of interest.

This system is an improvement upon that which has long been in use by Cuban growers, in that it advocates a better preparation of the land, the growth of a leguminous crop before planting the canes, and the intelligent use of commercial fertilizers.

The land which is to be planted with cane in October or November should be ploughed about nine months previously (February or March), and a leguminous crop, such as velvet beans, sown in April or May. About August this crop should be ploughed under, and the land harrowed two or three times with the disc harrow. When the canes are to be planted, it is recommended that deep furrows, at distances of about 7 feet from each other, be opened by a double mould-board plough, and a complete manure of artificials (where necessary) distributed at the bottom of the furrows previous to planting. The cane used for planting purposes should be selected from vigorous plant canes or first ratoons, and the pieces set horizontally in a continuous row at the bottom of the furrows. If the soil is moist they need not be covered to a depth of more than 3 inches, but if dry, a depth of 6 inches of soil is recommended.

Harrowing takes place just as the shoots are peeping through the ground, the harrows being drawn in the same direction as the rows run. This operation greatly encourages early growth. Cultivating or hoeing begins when the plants are well up: this is usually done in Cuba with a horse cultivator, and the hand hoe is needed only for removing weeds and loosening the soil between the plants in the rows. It is recommended that the operation be repeated frequently in the early months of the year in order to keep down weeds, and to maintain a surface mulch of loose soil. In April, or early in May, it is advised to sow cowpeas broadcast between the rows of sugar cane, covering them afterwards with the horse-cultivator.

The above method of cultivation is specially adapted for lands which have good natural drainage, but on land deficient in this respect, the system should be modified, and the land ridged up around the canes, by means of disc cultivators.

In Cuba, ratoon crops of sugar-cane are produced for several years on the same land, and provision must be made for maintaining the soil in good condition and keeping up the supply of plant food. The methods devised by the officials at the Cuban Experiment Station for this purpose is as follows: as soon as the cane is cut, a horse rake is drawn across the rows, and worked so that the trash from the first 'middle' (i.e., the space between two rows of cane) is pulled on to the second, and that from the third middle on to the fourth. In this way the spaces between the rows across the field are alternately bared or double-trashed. The cleared 'middles' are now ploughed, the soil being turned away from the cane rows, and the last furrow runs close up to the cane so that artificial manures can be applied around the roots, if necessary. The soil is then thrown back by a cultivator, and is kept well tilled by regular cultivations until the beginning of the rainy season, when the ratoons have grown to a good height. At this time the cultivated middle spaces are sown with cowpeas.

The alternate spaces which have been double-trashed are so thickly and heavily covered that practically no grass or weeds can come through, and these portions receive no further attention during the season.

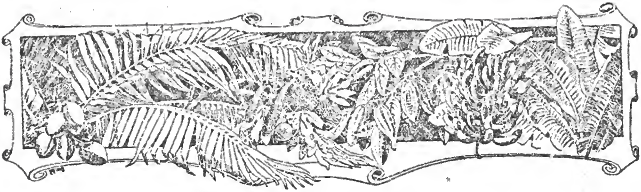
It will be seen that with this system of cultivation the ratoon cane crop is growing under excellent cultural conditions, for one side of each row is thoroughly cultivated, while the other is protected by a heavy mulch of trash, which serves to retain moisture. In the following year, with the second ratoon crop, the treatment of the middles is reversed, the spaces on which the cowpeas were cultivated in the previous year being doubly trashed, and vice versa. In this way the soil all over the field is thoroughly aerated and pulverized once in every two years.

Barbados Sugar Industry Agricultural Bank.

The Auditor of the Sugar Industry Agricultural Bank at Barbados has lately published his first report on the working of the institution. This report covers the thirteen months ending May 31, 1908. Under the Agricultural Bank Act, the agricultural year is defined as beginning on June 1 and ending on May 31. As the Bank was started on May 1, 1907, it was decided for the sake of convenience that the books should not be closed on April 30, but that the first 'year' of working should be extended to thirteen months.

The accompanying particulars are taken from a review of the Auditor's report, which appeared in the Barbados *Agricultural Reporter* of October 16:—

On May 1, 1907, there was transferred, from the Commissioners under the Plantations-in-Aid Act, to the members of the Bank, the sum of £96,360 5*s.* 8*d.* This included the Imperial Free Grant of £80,000, with accumulated profits amounting to £16,360 5*s.* 8*d.* The total sum was made up of £76,520 0*s.* 7½*d.* representing loans due from 153 plantations against the crops of the years 1903-7, and there was in the Colonial Bank the sum of £19,840 5*s.* 0½*d.* During the period under review loans to the extent of £97,692 18*s.* 7*d.* were made to 93 plantations. The interest amounted to £3,645 17*s.* 8*d.*, and the expenses to £1,339 10*s.* 11*d.* The net income for the period is therefore the sum of £2,306 6*s.* 9*d.* If this net income be added to the accumulated profits as at May 1, 1907—i.e., £16,360 5*s.* 8*d.*—the total accumulated profits to May 31, 1908, stand at £18,666 12*s.* 5*d.* Add to this sum the amount of the Imperial Free Grant of £80,000 and there appears a fund at May 31, 1908, of £98,666 12*s.* 5*d.* This total amount is made up of £27,948 2*s.* 11½*d.* due from plantations, as loans against crops; £50,000 in the Colonial Bank at interest and £20,718 9*s.* 5½*d.* on open account.



WEST INDIAN FRUIT

ORANGE TRADE IN SPAIN.

From reports prepared by the British Consul-General at Barcelona, it would appear that the orange trade of Spain has of late years been in an unsatisfactory condition. This applies not only to Spanish growers and shippers, but also to receivers in the United Kingdom and other countries to which the fruit is shipped.

This depression is chiefly attributed to (1) over-production. The size of the Spanish orange crop having steadily increased for some years past; (2) the production of oranges on a large scale in other countries, which are shipped to the same markets as the Spanish product; (3) the enormous quantities of fruit such as bananas, apples, etc. that flood the same markets.

The Consular report referred to, which was prepared at the request of the Imperial Commissioner of Agriculture for the West Indies, through the Colonial Office, states that matters have shown a slight improvement quite recently, because no more trees are likely to be planted, and the output will not continue to increase.

Valencia is the chief port from which Spanish oranges are exported to England, and in 1905 the shipments to British markets reached 1,594,274 cases, containing from 420 to 1,120 oranges, according to size. In 1903 the exports were much larger in quantity. In addition considerable shipments of oranges are now made from Seville and Malaga.

Orange growers in Spain usually sell their whole crop direct to packers, who pick, classify, and pack the fruit, and either sell it again in Valencia to dealers for export, or more generally consign it by arrangement to a broker in a foreign market. Some growers do their own packing, or part of it, especially when the low price offered by the packers lead them to think they could do the business better themselves. Other packers work on commission either for dealers or growers.

It has been mentioned that one cause for the depression in the Spanish orange trade is the large import into Great Britain of other fruits such as apples and bananas. A tendency to increase the price of oranges leads to a decreased demand, and the substitution of other fruits. It is mentioned that oranges have already felt severely the introduction of Jamaica bananas into the United Kingdom, and this has undoubtedly given a check to the development of the Spanish trade.

Until recently, it would appear that growers have been making handsome profits, and this opinion is confirmed by the large area under young trees. It has been the custom to force production by the application of extravagant quantities of artificial manures, which, it is stated, has increased the quantity of the crop at the expense of quality. A continuous advance in the price of the wood from which the orange boxes are manufactured is mentioned as another difficulty with which the Spanish industry has had to contend.

FRUIT PRODUCTION IN THE BAHAMAS.

The fruit-producing industry of the Bahamas has not been in a very satisfactory condition during the past two years, but the latest report (1907) of the Curator of the Botanic Station at Nassau speaks hopefully as to the future prospects of citrus fruit and pine-apple production in the colony.

The drought experienced during 1906 and early in 1907 to a large extent accounts for the recent falling off in the fruit output, while the opinion is also entertained that the pine-apple industry of the Bahamas is suffering from degeneracy of the plants cultivated, owing to continuous inbreeding of local stock.

A special grant of £100 has been allotted by the Board of Agriculture for experiments in pine-apple cultivation. These experiments, which were started last year, include both manurial trials and tests with local and imported varieties. The imported varieties were obtained from Jamaica and include Red Spanish, Green Ripley, Red Ripley, and Sugar Loaf. They have so far made a more vigorous growth than the local kinds of pine-apples.

The total value of the pine-apples exported from the Bahamas during 1906-7 was £30,614. This shows a decrease of £875 compared with the value of the pine-apple shipments of 1905-6 and £5,035 from the exports of 1904-5. The prospects for the 1908 crop of pine-apples were stated to be encouraging. It has undoubtedly been proved that grape-fruit and oranges of excellent quality can be produced in the Bahamas, but the value of the citrus fruit exports fell from £3,785 in 1905-6 to £2,620 in 1906-7. Samples of grape-fruit and oranges from the colony have been shipped to England and Canada, and an improved condition of the market is expected in the future. The Curator in his report emphasizes the necessity of greater care in handling, selecting, grading and packing citrus fruit intended for export, and mentions that the grapefruit and oranges exported from the Bahamas are at present in danger of getting a bad reputation on the foreign market owing to negligence in these matters, and the shipment of inferior fruit.

RICE CROP OF BRITISH GUIANA.

Messrs. Sandbach, Parker & Co., of Demerara, in their fortnightly report, dated October 30, on the condition of the rice industry of British Guiana say:—

The weather during the past fortnight has continued dry, and suitable for harvesting and milling. Reaping is going on all over the colony, and quality of paddy is good.

Rice is now coming into town freely, and several shipments have been made to the West Indian Islands during the fortnight, amounting to about 2,300 bags all told. Enquiries continue to come in from all parts and several sales have been effected at the prices indicated below.

Growers of paddy are holding for high prices, and millers have had to advance their prices to obtain supplies. The competition is keener than ever before, and lack of combination among buyers and their agents is responsible to a considerable extent for the high prices being paid for paddy.

Present prices are; per bag of 180 lb. gross, 20*s.* to 20*s.* 6*d.*; and per bag of 164 lb. gross, 18*s.* 3*d.* to 18*s.* 9*d.*

NEVIS.

Address on Soil Analysis.

At a special meeting of the Nevis Agricultural and Commercial Society held on October 15 last, Dr. Francis Watts, C.M.G., in response to the request of members, gave an address on the subject of soil analysis and its relation to agricultural problems, particularly in relation to cotton.

Dr. Watts pointed out that an acre of soil to the depth of 3 inches weighed about 1,000,000 lb., so that a quantity of 100 lb. per acre of any soil constituent was 0·01 per cent., if the soil were considered to a depth of 3 inches, but only 0·0025 per cent. if taken to the depth of a foot. He further pointed out that the quantities of constituents, such as nitrogen, potash, and phosphates, removed from the soil by a crop of cotton are so small as not to be readily estimated by chemical analysis, and therefore no useful purpose would be served by carrying out the suggestion, which was sometimes brought forward, that the manurial requirements of the cotton crop would be ascertained by analysing the soil before and after bearing a crop.

Dr. Watts then explained in some detail the methods adopted in the physical and chemical analysis of soils, and laid before the meeting the statements of analysis of a number of Nevis soils, which were then generally discussed.

The necessity of carrying out occasional experiments in the course of their ordinary estate work was impressed upon the members present, as in this way useful knowledge might be obtained as to methods in which their estate practice might be modified with profit to themselves. The need for thorough tillage, the adequate use of pen manure and of proper weeding were also emphasized. It was shown that cotton is one of the least exhausting crops provided that the seed is returned to the soil, either in the form of cotton-cake-meal, distributed as manure, or first fed to cattle and the resulting pen manure applied to the land. If the seed is not so returned the defect may be made good by green dressings.

Attention was drawn to the experiments with sugar and cotton now in progress under the care of the Department of Agriculture, at St. Kitt's-Nevis and other islands, and planters were urged to give them thoughtful consideration.

In reference to the present season's cotton crop at Nevis, Dr. Watts expressed the opinion that it showed evidence of better cultivation and more care than in past years, and he hoped these efforts at improvements would be continued.

The meeting closed with a vote of thanks to Dr. Watts for his address.

INSURANCE OF CROPS AGAINST HURRICANE DAMAGE.

Particulars of the scheme of insurance of buildings and growing crops in the West Indies against damage by hurricane, that has been arranged by a leading firm of brokers in London, have appeared in past numbers of the *Agricultural News* (see Vol. V, p. 129, and VII, p. 185). This subject was lately dealt with in a lengthy article in the London *Times*, from which the following extracts have been made:—

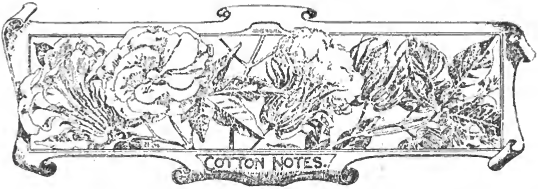
The object was to give planters in Dominica (in connexion with which island the idea first originated) an opportunity of covering not only their buildings, but their estates, and it was originally arranged to take both the buildings and the cultivations at inclusive premiums. These two interests, are, however, now treated separately, but underwriters only consent to take cultivations on condition that the buildings are also insured. Rates for the buildings vary from 1½ per cent. for out-houses to ⅜ per cent. for first-class risks with parapet walls, i.e. stone walls that are continued up beyond the eaves, so as to give the wind no opportunity of getting under the roof and blowing it off. There is no hard and fast definition of a hurricane in the policy: the only test is the damage done. If it amounts to the agreed percentage of excess, the insurers are liable, and all that is required is that the damage should be done by wind.

Besides lime trees and cacao trees (which form the chief cultivations in Dominica), arrangements have been made to cover other forms of cultivation, such as sugar-canes, cocoanuts, and coffee. With regard to sugar-canes there have been practically no inquiries for insurance in the English islands, but a considerable amount of business has been done in the French island of Martinique. The difficulties of assessing damage from hurricane are so great in the case of the sugar-cane that it is doubtful if the arrangement is satisfactory.

In regard to bananas, the brokers have, so far, persistently refused to accept this crop for insurance, partly on account of the fact that it is so easily liable to damage, and perhaps still more on account of the difficulties in assessing this damage. Further, if the insurers were to pay all the claims that would be advanced in connexion with this crop, the premiums would be so high as practically to prohibit business.

The only insurance of coffee which has so far been effected is on two estates in the Blue Mountain district of Jamaica. Here, the average crop of ten years is taken, and should a hurricane occur, the loss is assessed by the insurers agreeing to pay the difference between an amount slightly under the value of the average crop, and the actual produce of the sales of the coffee at Liverpool.

Growing cotton is also covered specially during the hurricane months alone, i.e., from June to October inclusive. There is a fixed scale of compensation increasing in amount as the season goes on, and this is based on calculations of the probable loss a planter suffers by reason of having his cotton destroyed by hurricane. If this occurs early in the season, the cotton can be replanted, but if later on, all that can be done is to put in a catch crop, and the scale of compensation for September and October, therefore, is from double to treble the amount of the earlier months.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of October 26, with reference to the sales of West Indian Sea Island cotton:—

The Lancashire mills still continue closed, with the result that there is little or no business passing in any description of cotton. However, about 50 bags of West Indian Sea Islands, comprising Anguilla and Barbados at 14*d.*, and St. Vincent at 17*d.*, have been reported for export.

The American holders in Charleston and Savannah are very eager sellers, but there is a general census of opinion that prices are near the bottom, and that as soon as the strike is over, better conditions will prevail.

COTTON CROP IN THE SEA ISLANDS.

Recent reports from Messrs. Henry W. Frost & Co., of Charleston, state that the cotton crop in the Sea Islands is being harvested early, but at present the demand is only moderate, and the market is quiet.

In Messrs. Frost's report dated October 17, it was mentioned that three planters' crops, kept over from last year's cotton crop, were sold for England and France at prices ranging from 32c. to 37c. So far as could be judged from the odd bags of cotton received at that date, it was reported that the character of the crop was very disappointing, the larger proportion classing as cotton of 'fine' quality, and as lower grades. It was difficult to select any cotton of quality as high as the 'fully fine' grade. The Georgia crop is also described as consisting in large proportion of cotton which is irregular and short in staple, and which will not therefore command a high price.

On October 24 Messrs Frost write:—

The large proportion of odd bags received continue to class 'fine,' with only a small percentage of 'fully fine.' The 'fully fine' cotton is being held firmly at 26c. per lb., but 'fine' qualities are selling at 24c.

There has been some demand at the above prices, principally on account of the Northern mills, and for export. There has also been a demand from England for planters' crop lots of last year, and from 500 to 1,000 bales could easily have been disposed of, if factors had been willing to sell at 30c. They are holding out, however, for 32c. per lb.

On October 31 Messrs. Frost report:—

The market has been quiet throughout the past week with sales of only 250 odd bags at prices of 24c. per lb. for 'fine' cotton, and 26c. for 'fully fine'. Receipts are increasing, and stocks accumulating.

The total amount of Sea Island cotton ginned in the United States (from the Islands, Carolinas, Florida and Georgia) up to October 31, has been 32,462 bales, as against 18,755 bales ginned to same date last year. This year, however, the crop is being got in earlier.

BRITISH COTTON GROWING ASSOCIATION.

A meeting of the Council of the British Cotton Growing Association was held at Manchester early in October, when some interesting particulars in regard to the progress of cotton growing in Africa were laid before the members.

It was reported that a considerable quantity of cotton of superior quality is now coming forward from the British East Africa Protectorate. From Uganda and the districts adjoining the great lakes good reports were to hand, and it is anticipated that the yield this season will amount to several thousand bales of cotton, valued at ½*d.* to 1½*d.* per lb. over Upland American of medium quality.

The reports from Nyassaland continue favourable, and shipments of last year's crops are now coming forward. With regard to West Africa, it was mentioned that the purchases of cotton in Lagos for the month of September were equal to 70 bales, bringing the total purchases from the beginning of the year up to 5,284 bales.

The Tamele district of the Northern Territories of the Gold Coast has been described as well suited for cotton growing, and it has been decided to obtain the opinion of an expert as to the possibilities of cultivation in the district.

It was mentioned that a report had been received on the cultivation of Egyptian cotton in Sind during 1907. The area sown with Egyptian cotton was 6,835 acres. As far as can be ascertained, the total crop was between 1,700 and 1,800 bales of 400 lb. Good prices were obtained for the cotton, which was principally sold for use in the Ahmedabad and Bombay mills.

The resolution passed at the Conference with the West Indian cotton-growing delegates in August last, urging upon the Government the vital importance of establishing a Central Department for Tropical Agriculture was discussed, and the opinion was expressed that everything possible should be done to push forward the establishment of such a Department.

COCOA-NUT PRODUCTS IN CEYLON, 1907.

The accompanying particulars in regard to the extent of the cocoa-nut crop of Ceylon, and the products prepared from it appear in the latest annual report of the Planters' Association of the island:—

The year 1907 has been quite the best on record for cocoa-nut planters in Ceylon, for though crops were generally short, yet the high price of copra in the early part of the year more than compensated owners for such shortage. On February 27, the price rose to £5 16*s.* 6*d.* per 500 lb., which is the highest figure on record for this article in the annals of Ceylon history. The total export of copra (347,970 cwt.) was about 76,000 cwt. short of the quantity sent out in 1906; the cocoa-nuts in the shell were less by 2½ million nuts. Oil also shows a falling off in shipment by 50,000 cwt., 460,683 cwt. going out this year, as against 511,720 in 1906; whilst poonac, i.e., the cake left after expressing the oil from cocoa-nut pulp, naturally shows a similar decline.

This falling off in the crop is generally considered to be due to the very dry season of 1906, which seriously affected in many districts the young nuts then setting for maturity in 1907. Germany was again this year the best customer for copra, and took almost half of the total export, while purchases by Belgium come next, which show a heavy increase over the business done in the previous year.

THE VALUE OF FARMYARD MANURE AS A FERTILIZER.

The value of farmyard manure as a fertilizing agent in connexion with the cultivation of English crops is discussed at considerable length in the June number of the *Journal* of the British Board of Agriculture. The average pen manure of the West Indies no doubt differs considerably in composition from the average farmyard manure of Great Britain, although this difference is but small in comparison with that which exists between the conditions of climate and crops, and the tillage methods of the two parts of the world. Yet many of the considerations which apply to farmyard manure are equally applicable to the uses and qualities of pen manure.

From a large number of analyses, it appears that farmyard manure consists, on the average, of about 75 per cent. of water, about two-thirds of 1 per cent. of nitrogen, one-quarter of 1 per cent. of phosphoric acid, and one-third of 1 per cent. of potash, or per ton about 15 lb. of nitrogen, 5 lb. of phosphoric acid, and 7 lb. of potash. The composition, however, naturally varies with the feeding of the animals and the manner in which the manure has been stored.

During storage, various chemical changes go on in the heaps of manure. As a result, many compounds are given off in gaseous form. Some nitrogen is lost in this way, but the proportion of non-nitrogenous organic matter which passes off is still greater. Water is also evaporated, and as a result of all the changes, the manure which has been stored for a considerable time is more concentrated, containing more dry matter, and a higher percentage of nitrogen, potash, and phosphoric acid in the dry matter. One effect of the fermentation which is in active progress is that the active compounds of nitrogen, such as ammonium carbonate, grow less on storage of the manure, as they are converted into insoluble protein-like bodies. Hence, old pen manure is slower in its fertilizing action, and less caustic in its effect upon the delicate roots of seedlings, than fresh manure.

As a direct fertilizing agent, the chief value of pen manure lies in the fact that it contains all the elements of a plant's nutrition—nitrogen, phosphoric acid, and potash—although the phosphoric acid is deficient compared with what it should be in a well-balanced fertilizer. As a result of the various stages of availability in which the nitrogen is present in pen manure, its effect is not fully evident shortly after application, but its influence is continuous for a more or less considerable time after being put on the land.

It is often pointed out that the value of farmyard manure to the land is not altogether confined to its fertilizing properties; its physical effects upon the texture and water-holding powers of the soil are equally important, and indeed, in droughty seasons, particularly with some crops, these effects count for more than fertilizers towards ensuring a good yield. The manure as it rots down into the soil goes to restore the stock of humus which is always undergoing oxidation, and tending to be diminished in quantity. Humus acts beneficially both on light and heavy soils; to sands it gives cohesion and water-retaining power, while by loosely binding together the finest particles of clay soil, it renders them more porous and pliable.

As already mentioned, a soil which has been enriched in humus by continued applications of pen manure will resist drought better than one in which the humus content is low, and investigation has shown that the difference does not depend so much upon the greater amount of moisture present in the soil containing humus, as in the way this soil will absorb a large amount of water temporarily during heavy rainfall, and then let it work more slowly down into the soil, thus keeping it longer within reach of the crop.

FIBRES FOR PAPER-MAKING.

Various fibrous waste materials are under investigation by the Department of Agriculture of the United States, with a view to determining the possibilities of their utilization in paper-making. Some results of the experimental treatment of maize stalks have been pronounced satisfactory.

A note in *Nature* of October 22 points out that this matter is one of importance, and refers to the number of waste fibrous materials such as megass, cotton-seed hulls, flax and hemp straws which contain fibres useful for paper-making, and are available in sufficiently adequate quantity in certain parts that, if utilized, they would form a serious factor in determining the world's supply, as well as the ultimate cost of paper.

All the above-mentioned waste fibres have been many times worked up into papers of good quality, but, with the exception of the fibre of the cotton-seed hull, this has not been done under ordinary industrial conditions. It is satisfactory to note that within the past two years, a definite commercial success has been recorded with cotton-seed hulls, as the result of a treatment which is mainly mechanical. The resulting product is now on the market under the name of 'Virgo fibre' paper.

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EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The possibilities connected with the more general cultivation of vegetables and other small crops in the West Indies are discussed in the editorial.

A system of sugar-cane cultivation recommended by the Cuban Agricultural Experiment Station to planters in the island is described on page 355. This is followed by some particulars extracted from the first report of the Barbados Sugar Industry Agricultural Bank.

Some notes on the orange trade in Spain, which at present is in a somewhat depressed condition, and on fruit production in the Bahamas, will be found on page 356.

The system of insurance of crops in the West Indies against damage by hurricane is dealt with on page 357, and on the next page reports are given as to the condition of the Sea Island cotton market in England and the United States.

A brief article on page 359 discusses the composition and manurial value of farmyard manure.

The best methods of dealing with attacks of lice and mites on poultry forms the subject dealt with under Insect Notes (page 362).

The 'Students' Corner' is continued on page 363, and attention may also be drawn to the article 'Rubber in the West Indies' on the same page, and that giving an account of experiments with a number of fodder crops at Dominica, which appears on page 366.

Rum Manufacture at Barbados.

From the particulars set out in the report on the Excise branch of the Customs Department at Barbados, it is seen that the rum stills worked in the island during 1907 were five in number, viz., the West India Rum Refinery, the Premier, Carrington in St. Philip, and Mount Gay (2 stills) in St. Lucy.

Altogether 210,612 gallons of rum were manufactured during the year. Of this quantity, by far the greater proportion was made by the West India Rum Refinery, Ltd., which turned out 154,552 gallons (or 76 per cent. of the whole): 24 372 gallons were made at the Premier, 16,159 gallons at Carrington, and 15,099 gallons at Mount Gay. With the exception of 700 gallons exported to other colonies, and 918 gallons issued as 'ships stores,' all the rum manufactured was consumed in the island.

◆

Tobacco Experiments at St. Kitt's-Nevis.

Tobacco experiments with Havana, Sumatra, and Virginian varieties are being continued this season at La Guerite, St. Kitt's, under the direction of Mr. F. R. Shepherd, Agricultural Superintendent. These trials have now been in progress for several seasons, and while the growth of tobacco both under shade and in the open has been all that could be desired, the process of fermentation has, so far, failed to develop the best aroma and the combustible qualities evident in a good sample. This is attributed to the fact that the temperature reached during fermentation has not been sufficiently high. The quantity grown is small, not exceeding 350 lb. of cured tobacco, and under these circumstances it is not so easy to produce a high temperature as with a larger quantity. The tobacco under experiment should be ready for reaping about the end of December, and it is hoped that more favourable results will be obtained from fermentation than in past seasons.

◆

Keeping Powers of Ripe Mangos.

Some experiments were lately carried out in British Guiana under the auspices of the Department of Science and Agriculture to test the effect of immersion for a short time in a 3 per cent. solution of formalin (a treatment which is known to have a preservative influence in the case of many soft-skinned fruits) upon the keeping power of mangos. The tests were made with 260 mangos, belonging to twenty-three different varieties. The fruits were, in every case, gathered two at a time, one being immersed for ten minutes in the formalin solution, and the other, which was not treated with formalin, being kept under precisely similar conditions for control purposes. The mangos were handled with every care, and examined daily.

Instead of exercising a preservative influence on the fruits, it was found in practically all cases, that the use of formalin tended to lessen the number of days which elapsed before the mangos became unfit for eating purposes. Incidentally, the experiment has shown that, with careful handling, mangos will, on the average, keep for ten or twelve days in British Guiana, and it is expected that in cold storage their keeping powers would be much increased.

Rubber Planting in Hawaii.

The Ceara tree (*Manihot Glaziovii*) is the favourite variety of rubber among planters in Hawaii. In a recent bulletin issued by the Hawaiian Agricultural Experiment Station, it is stated that up to the beginning of the present year 400,000 rubber trees had been planted in the islands, of which about 90 per cent. were of the Ceara variety, the remainder consisting of *Castilloa elastica* and *Hevea brasiliensis* in about equal proportions. There are now five large rubber plantations in operation, and rubber yielding trees are being planted on a small scale by numbers of planters. It was intended to make a first tapping, on a commercial scale, of some of the trees in the oldest plantation during the present year, or as soon as they have reached a circumference of 20 inches.

Analysis of Okra Plant.

A sample plant from a field of okra grown by Mr. S. C. Thorne, of Barbados, was recently submitted for analysis to the Government Laboratory of the island. From Professor d'Albuquerque's statement it appears that this okra plant contained 18·85 per cent. of dry matter, including 2·19 per cent. of albuminoids and other nitrogenous matter, and 3·03 per cent. ash. The potash present in the ash amounted to 0·41 per cent. of the total weight of the plant, the phosphoric anhydride to 0·17 per cent., while the organic or humus-forming matter (total dry matter, less the ash) amounted to 15·82 per cent.

The weight of one hole of okra was 8·7 lb., and therefore the total weight to the acre (1,452 holes) was at the rate of 5·6 tons. This amount would include 1,998 lb. of organic matter, 44·2 lb. of nitrogen, 51·8 lb. of potash, and 21·5 lb. of phosphoric anhydride.

Banana Trade of Trinidad.

The banana exports of Trinidad have increased enormously during the past twelve months, and in this period over 60,000 bunches were shipped from the island by the Royal Mail Company. In view of the extending demand for this fruit in England and other European countries, there is, no doubt, abundant scope for further developments in the near future.

This question of the trade and its prospects were recently discussed in an editorial article in the *Port-of-Spain Gazette*. While a good deal of gratification is expressed at the results so far achieved in building up a fruit trade for Trinidad, reference is also made to two matters which need attention if the industry is to progress satisfactorily. One of these difficulties is the failure of growers in the island to produce, in sufficiently large quantities, bananas of the size and quality in chief demand on the market, and the second is the high freight charges of the Royal Mail Company. Probably if the first trouble were remedied and larger and superior supplies brought forward for shipment, it would be found possible to remove the second difficulty. There is every reason to believe that bananas of excellent quality can be produced in Trinidad and the matter is well worthy of the attention of those in the island best qualified to help.

School Gardens at St. Lucia.

The Education Department of St. Lucia is making endeavours to encourage school garden work, and of the twenty-one boys' schools in the colony, garden plots are attached to sixteen, and will shortly be started in connexion with two others. Two of the schools in Castries, by reason of their situation, are unable to have gardens, and it is suggested by the Inspector of Schools that the difficulty might best be met, as has been done in British Guiana under similar conditions by the establishment of a model garden at the Botanic Station, where the town boys could receive agricultural instruction. The work at present is necessarily more or less in an experimental stage, and the Inspector points out that it is in need of expert direction to make it more systematic. A substantial bonus to head teachers who receive a good report for agricultural instruction is also mentioned as a means whereby the work would be encouraged. A sum of £40 is to be distributed as special bonuses to teachers who did good work in 1907.

Barbados Milch Cows.

The milch cattle kept at Barbados are very mixed in type, and are undoubtedly in most cases the result of crossing with a number of the best known breeds. Nevertheless the Barbados cow is recognized as being the best in the West Indies for milking qualities. The Ayrshire type is frequently noticeable among cows in these islands, and this breed of cow is a very economical animal to keep. It will find pasturage in the fields during the most droughty season, and is very hardy in constitution. The large amount of white in the coats of many Ayrshires makes these animals liable to blistering by the sun's rays, but it is of course possible, to a large extent, to breed out this white, by crossing with dark-coated native cattle.

The Holstein element is also prominent in the case of some Barbados cattle. These cows are large animals that do not readily put on flesh, but yield a large volume of milk of poor quality. The male calves become good serviceable beasts of burden Shorthorns have in the past been often imported into Barbados, and cows in which the Shorthorn type is very evident are frequently seen. Owing to the long fine hair in the coat of this breed the cows suffer from the heat of a tropical climate.

The value of the Jersey as a milch cow is well known in all parts of the world. The animals of this breed easily take first place as regards the richness of their milk in fat and total solids, and where butter-making is carried on, the Jersey breed is undoubtedly the one from which the cows should be selected Jersey cows do well in the tropics, their short, thick coat serving as an admirable protection from the effects of the sun.

A good method of feeding milch cows in the West Indies is to give them 75 lb. of green fodder, together with 8 lb. of dry feed, the latter consisting of equal parts of corn meal, pollard, and cotton-seed meal. Guinea corn fodder is valuable for keeping up the milk yield.

INSECT NOTES.

Lice and Mites on Poultry.

Poultry are frequently supposed to be suffering from some disease when their ill health is really due to the abundance of lice or mites which are infesting them. Ordinarily, the fowls by squatting in a hole in the ground, and scratching the dust around their bodies, are able to keep the parasites in check. But in the case of sitting hens the insects increase to an enormous extent, and the chickens on being hatched out are at the mercy of these parasites.

LICE.

Lice are more numerous than the mites, but they are less injurious, as they are not blood-sucking by nature. The lice are provided with short-toothed jaws with which they bite off the epidermal scales and the edges of the feathers. The claws of their feet are very sharp and by the process of continual scratching on the skin of the host, a supply of blood is procured by the parasite, and upon this it feeds. Poultry do not suffer from loss of blood, but from nervous exhaustion due to the continual biting off of their scales, while the pricks from the claws of the insects often result in ulcerations.

The common hen louse (*Menopon pallidum*) is an insect which is pale dull yellow in colour, with lateral darker marks, but at times after feeding the colour may be of a pinkish tint. The length is $\frac{1}{16}$ inch; its head is broad and rounded in front. The insect is wingless.

The adult louse is very active, wandering continually over the skin. The eggs or 'nits' are small, elongate, oval objects, and are attached at the broader end to the feathers. The young insects, produced from the eggs, are much smaller than the adult, and they remain close to the body of the host until they reach maturity, which takes from two to three weeks under conditions favourable to their development. Such conditions are a damp and dirty state of the fowls' body.

Remedies for lice on fowls :—(1) Saturate sawdust with naphthalene and place beneath the nest of setting hens. (2) Dip the hens in an infusion of tobacco, made by boiling tobacco stems, leaves, etc. for fifteen minutes. (3) Fumigate the hen house with sulphur two or three times, allowing ten days to elapse between each operation so as to kill the newly hatched parasites.

MITES.

The chicken mite (*Dermanyssus gallinae*, Redi.) is elliptical and rather flattened in shape, and about $\frac{1}{8}$-inch long. The colour is pale grey with darker spots, but after feeding it becomes reddish. It has eight slender, tapering legs, a pair of palpi in front, and a pair of needle like mandibles, with which it procures its food.

The adult mother lays her small eggs in dirty crevices of the hen house. The young hatch in two or three days, and when born, are whitish in colour, oval in shape, and have but six legs.

At first they feed on filth, but when older attack the chickens. After feeding a few days, they molt and appear with eight legs. They do not remain on the poultry all the time, but usually only long enough to feed and are most active at night.

The chicken mite is parasitic on all kinds of poultry except pigeons, although they attack horses and even man. The mite found upon pigeons is a distinct species. Remedies for mites are :—(1) Keep the poultry in a clean, dry house with plenty of sunlight. (2) Whitewash the inside of the house, adding 4 oz. of crude carbolic acid to every gallon of wash, and repeat after four days. (3) Spray with kerosene emulsion. (To make this, shave $\frac{1}{2}$ lb. of hard soap into 1 gallon of soft water and boil until the soap is dissolved; remove the mixture from the fire and stir into it 2 gallons of kerosene oil). Dilute this stock mixture with 10 parts of soft water and apply as a spray or with a brush. Repeat this application twice at intervals of four days.

The 'itch mite' (*Cnemidocoptes Mutans*, Robin) is the cause of 'scaly leg.' This parasite burrows in the skin of the legs, comb, and neck, causing an intense itching and forming a crust of loosened tissue above the places where it has burrowed. A good remedy is to bathe the infested parts in warm, soapy water and then apply sulphur ointment.

The 'depluming mite' (*Cnemidocoptes gallinae*, Rail.) burrows near the base of the feathers, and the itching induces the hen to pluck her feathers in her attempt to stop the irritation.

EGG-LAYING COMPETITION.

A few details as to the results of an egg-laying competition which was held at the Roseworthy Agricultural College, South Australia, from April 1, 1907, to March 31, 1908, may not be without interest.

The number of pens competing was seventy-five, each pen containing six birds, so that the total number of birds engaged in the competition was 450. These birds together produced 80,959 eggs, or an average of 17·99 per head. The highest number of eggs laid by any pen was 1,531, these being produced by six White Leghorns, while the greatest number laid by any given bird (also a White Leghorn), was 255. The total cost of the food consumed during the year by the 450 hens was £120 18*s.* 5*d.*, this being an average cost of 1¼*d.* per hen per week, or 5*s.* 4*d.* per hen per year. Since the average value of the eggs laid during the year was 11*s.* 8*d.* per hen, it will be seen that poultry of the type included in the competition gave a return of over 100 per cent. profit on the food consumed. The White Leghorn breed undoubtedly did best in the competition taking the first nine places, and showing up well throughout. Other breeds notable for their good laying power were Silver and White Wyandottes, and Black Orpingtons.

DEPARTMENT NEWS.

Mr. John R. Bovell, I.S.O., Agricultural Superintendent of Barbados, who has recently been in England on leave of absence since June 2 last, returned to the island by the R. M. S. 'Orinoco' on November 10, and has resumed his duties.

Mr. W. N. Sands, Agricultural Superintendent of St. Vincent, who has been on leave of absence since May 18 last, also returned by the 'Orinoco.'

STUDENTS' CORNER.

The series of notes and questions which were started in the last issue of the *Agricultural News*, with the object of affording assistance and guidance to young men employed on estates entering upon the Reading Courses in Agriculture, are continued below. As already explained, there was some unavoidable delay in starting, and the notes now published relate to October work on estates. After this issue, however, the notes will be brought up to date, and will be regularly continued in future numbers.

Seasonal Notes.

OCTOBER.

1ST FORTNIGHT.

Growing canes may now be expected to arrow; observe the manner in which the arrow originates; endeavour to make out the structure of the flower, noting the stamens and stigma. Study the question of producing seedling canes.

Note what weeds make their appearance on land prepared for crops. See if any relationship can be traced between the kind of soil and the type of weed that appears upon it.

Caterpillars may be troublesome in cotton fields; collect some and feed them on cotton leaves; note the growth, the changes of skin, and the transformation into pupa (chrysalis), and moth, recording the time the various stages occupy. Make drawings. Note the presence of other pests; observe their habits, and ascertain the steps taken to control them.

Early cotton may be in bearing during the first fortnight of October. Note how long it takes a cotton flower-bud to form and to open, how long the flower remains open, and how long it takes a boll to form and ripen.

OCTOBER.

2ND FORTNIGHT.

Limes and cacao will be in fruit in the latter half of October; observe the development of the fruit from the flower. Observe what insects visit the flowers of these trees, and, if you can, ascertain how pollination is effected.

Green dressings will have been grown and ploughed in; note how long it takes for these to decay; see whether any physical effect can be observed in the soil.

During or after rain note how the water is absorbed by the soil, and that later some of it drains off the surface. Observe where it flows, and what effect this has on the surface of the field and on the tilth.

QUESTIONS FOR CANDIDATES.

PRELIMINARY QUESTIONS.

(1) Sulphate of ammonia is dissolved in water: how could you recover the sulphate of ammonia in solid form?

(2) Give a brief account of some of the principal functions of water in connexion with plant life?

(3) Give an account of the manner in which you think the soil in the neighbourhood in which you live has been formed?

INTERMEDIATE QUESTIONS.

(1) What elements of plant food are supplied by pen manure? What change does pen manure undergo in a soil, and how does it influence the texture of a soil?

(2) What advantages are claimed for flat cultivation, and for the plan of throwing the land into banks respectively? Discuss the merits of both methods?

(3) What do you understand by mulching? Describe several methods of mulching? What advantages are derived from the operation?

RUBBER IN THE WEST INDIES.

Some notes dealing with the introduction and distribution of rubber trees in the West Indies, and the developments that have so far been made in the rubber-producing industry in these colonies, as exemplified by the exhibits from the West Indies and British Guiana on view at the late London Rubber Exhibition, appeared in recent numbers of the *West India Committee Circular*. The notes were contributed by Mr. W. G. Freeman, B.Sc., formerly Scientific Assistant on the staff of the Imperial Department of Agriculture.

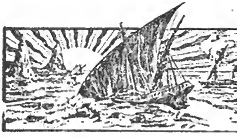
It is pointed out that the West Indian Islands, although naturally endowed with many products of economic importance, are not rich in native rubber-yielding plants. The rubber vine (*Forsteronia floribunda*) and a new rubber plant (*Odontadenia* sp.) recently brought to notice in Trinidad, are found wild, but these are of little commercial importance. The Central American rubber tree (*Castilloa elastica*), which grows wild in British Honduras, is nowhere found growing in a state of nature in the islands, and although one or two species of Hevea occur wild in British Guiana, the principal species, *Hevea brasiliensis*, is lacking. Various species of the genus Sapium are indigenous to British Guiana. These are of commercial importance as sources of rubber, and are receiving considerable attention. As is well known, too, balata—a kind of gutta-percha—is largely produced in British Guiana, and to a less extent in Trinidad from the native Bulletwood tree (*Mimusops globosa*). It is evident, therefore, that if any considerable output of rubber is to be expected from the West Indies, this will, to a large extent, be the product of introduced trees. Evidence of the work that has already been done was seen in the exhibits displayed at the Olympia in September last.

Trinidad—with its dependency Tobago—Dominica, and to a less degree, St. Lucia, were represented by exhibits of rubber obtained from plants none of which were native to the islands, while British Guiana made a good display of the products of native trees. There were also on view two Wardian cases of living rubber plants received in splendid condition from Trinidad and St. Lucia respectively. It is mentioned that these, which included the chief South American and African rubber-yielding plants which have been introduced into the West Indies, and the balata plant as well, formed, when opened up, a most attractive feature of the exhibit.

Among the samples sent from Trinidad, Central American rubber was well represented by specimens in block, sheet, biscuit and scrap from various estates. A large series of samples of Castilloa rubber, prepared from trees of different ages, was also on view from the Botanical Department. Specimens of Para rubber, too, were sent from the Department, but none were received from any estates in the island. Other samples from Trinidad were the produce of the Lagos silk rubber tree (*Funtumia elastica*), West African rubber (*Ficus Vogelii*), African vine rubber (*Landolphia* sp.), and Assam rubber (*Ficus elastica*).

Samples of Para, Castilloa, and Ficus rubber were on view from Dominica, and Mr. Freeman gives an account of the progress that has so far been made in the island with this cultivation (in this connexion see last issue of *Agricultural News*, page 343).

St. Lucia also sent specimens of rubber, together with a case of young plants, to the Exhibition. In 1905 it was estimated that there were from 300 to 400 trees in the island, chiefly planted as shade trees on cacao estates, and since then the distribution of young rubber plants from the Botanic Station has been actively continued.



GLEANINGS.

Grafted mango plants for sale within the island can be obtained at the Botanic Station, St. Lucia, at a price of 2*s.* each.

The Ayrshire bull 'Gipsy Star of Bellevue,' and the African woolless ram sheep 'Egbo' are both stationed for the present at the Agricultural School, Union, St. Lucia, where they are available for service. The fee is 2*s.* in the case of the bull, and 1*s.* in the case of the ram.

It is mentioned in the *West India Committee Circular* that the Colonial Fruit Show, arranged to be held in London on November 26 and 27, will remain open for two extra days, viz., Saturday and Monday, November 28 and 30.

The total export of bananas from Costa Rica in 1907, according to the returns of the United Fruit Company, was 10,165,759 bunches, this being an increase of 14·57 per cent. over the shipments of 1906.

Two male lambs, the progeny of one of the West African rams recently imported from Lagos by Sir Daniel Morris, have been shipped to Trinidad for breeding purposes in that island. Another ram lamb, the progeny of the same animal, has also been sold to a planter in Dominica.

The improvements which are evident on small holdings in Jamaica as the result of the Prize Holdings Competition is commented on by the *Journal* of the Jamaica Agricultural Society. On holdings which have entered for the competition, an improved water supply, better fences, and improved arrangements for storing and utilizing manure are frequently noticeable.

During 1907-8 only 255 sugar factories were in operation in France, as compared with 273 in the preceding year, 344 in 1897-8, and 375 in 1887-8. The decline in number is partly explained by increasing centralization, but beet cultivation has also lost ground in France during late years. The quantity of sugar produced in 1907-8 was 656,832 tons, as compared with 682,851 tons turned out in 1906-7, and 984,671 tons in 1905-6.

A note in a recent number of *Nature* refers to the vigorous measures that are now being carried on in Uganda for combating the spread of sleeping sickness. During 1907 there were no new cases among Europeans, and deaths among natives during the twelve months numbered less than 4,000. The whole of the population have been removed from the shores of lake Victoria Nyanza, and it is hoped that the disease-carrying fly in that belt, if not re-infected, will gradually cease to be a source of danger.

Reaping operations are in active progress on Demerara sugar estates. Reports state that the canes are dry and the yield of juice is less than was anticipated. The labour supply is insufficient to meet the demand. Few factories have been able to run six days a week, and wages have necessarily been advanced. (*Demerara Argosy.*)

From January 1 of the present year up to October 28 the quantity of rice exported from British Guiana was 6,427,144 lb., as against 4,897,654 lb. shipped during the corresponding period last year. The amount of rice-meal exported to date this year is 2,328 tons compared with 196 tons shipped to the same date in 1907.

The numbers of economic plants distributed during 1907 from the St. Lucia Botanic Station to purchasers of Crown lands in the island were: nutmegs, 744; kola, 412; coffee, 994; cacao, 5,200; rubber, 150; orange, 261; cinnamon, 261; vanilla, 25; and limes, 2,500.

A prize of £1 has been offered by Sir Bickham Sweet-Escott, K.C.M.G., to the peasant proprietor who exhibits at the coming St. Kitt's-Nevis Agricultural Show the best mule, that was sired by the stud jack 'Yankee Boy,' the property of the Imperial Department of Agriculture. Lady Sweet-Escott has also offered a prize of £1 for the best collection of vegetables grown by a peasant proprietor.

An unusually heavy rainfall was experienced at Trinidad throughout October, 12·96 inches being the fall registered for the southern portion of the island. From figures given in a late number of the *Port-of-Spain Gazette* it is seen that this is a higher figure than has been experienced during the month of October for the past nineteen years. October of 1892 previously bore the record at Trinidad, but in that month only 8·85 inches of rain were registered.

The following dates have been arranged for the School and Peasant Agricultural Shows that will shortly be held in Trinidad: Show at Princes Town, December 22; at Port-of-Spain, January 22; at San Fernando, February 5; at Arima, February 12, and at Scarborough, February 17 next. Prizes and diplomas will be offered for live stock, vegetables, and other produce, and awards will also be made for the best-kept gardens and cane plots.

The Agricultural Society of Trinidad and Tobago is offering a prize of $50 for the best essay on the subject of the 'Frog-hopper' an insect pest of the sugar-cane that is doing considerable damage to the sugar-cane in Trinidad. This insect belongs to the family Cercopidae, of the order Hemiptera, and is therefore related to the plant lice, plant bugs, scale insects, etc.

In reference to the question of maintaining a surface-mulch of loose soil on cultivated land, the Acting Agricultural Superintendent of St. Vincent draws attention to the value of light draw hoes and 'Dutch' scuffle, or push hoes, for this purpose. These tools have been found to be of great service at the Agricultural School of St. Vincent for rapidly cleaning and loosening the soil of cotton plots, and they might be the means of somewhat reducing the cost of estate cultivation where labourers have been educated to the use of such light implements.

OUR BOOK SHELF.
NOTES and REVIEWS.

THE FUTURE OF CACAO PLANTING. By Harold Hamel Smith. *London: John Bale, Sons & Danielson, Ltd.* Price 1s. net.

In this book is reprinted a lecture on the subject of cacao planting, manuring, pruning, and the preparation of the produce, which was delivered by Mr. H. Hamel Smith (Editor of *Tropical Life*) at the Colonial Fruit Show held in London in June last, together with the discussion which followed.

There is a brief introduction by Sir Daniel Morris, in which reference is made to the present condition of the cacao industry in the West Indies, and the Imperial Commissioner of Agriculture expresses an appreciation of the efforts of Mr. Hamel Smith in endeavouring to arouse the activities of planters and others in improving the cultivation and curing of cacao and generally extending the industry.

The points of chief interest dealt with in the lecture are the cultivation of leguminous crops in cacao plantations for green manurial purposes, the best methods of pruning, the propagation of cacao by grafting, the question of shade in cacao plantations, the utility of growing belts of rubber or other trees of economic value in cacao plantations, and the use of vacuum chambers for drying the cacao beans.

In the discussion which followed the reading of Mr. Smith's paper many men whose names are well known in connexion with the cacao planting industry of the West Indies and other tropical countries, took part. These included Messrs. Wm. Fawcett, W. Cradwick and A. N. Dixon (Jamaica), G. S. Hudson (St. Lucia), Bernard Acham (Trinidad), and A. E. Evans (Gold Coast), and it need hardly be said that their remarks on the various branches of the cacao industry contain many points worthy of note by those interested.

SOUTHERN AGRICULTURE. By Prof. F. S. Earle. *New York: The Macmillan Company, Ltd.* Price $1·25.

In this book of 297 pages Professor Earle, who is Director of the Cuban Agricultural Experiment Station, deals with agriculture as carried on under the conditions which prevail in the Southern States of America. It need hardly be said, however, that a good deal of information is included which is also of practical interest and importance to West Indian planters, since the characteristics, and methods of cultivation of tropical, as well as subtropical, crops come in for full discussion.

The first part of the book comes under the heading 'General Considerations,' and in this section the formation and nature of soils, their management, and methods of tillage, improvement of soils by drainage, irrigation and manuring are dealt with at considerable length. Hints are also given as to the uses of the various kinds of modern tillage implements. In that part of the book which deals with green manuring the cowpea is described as being without doubt the most important crop for this purpose in subtropical and tropical America, although the velvet bean is a formidable competitor. The cowpea can frequently be grown between the rows of other crops, such as sugar-cane or corn, whereas the velvet bean must occupy the ground alone. The insect and fungus enemies of crops receive attention, and although the whole subject is necessarily considered in outline only, full directions are given for the preparation and use of a number of insecticides and fungicides.

Part II of the book deals with the chief subtropical and tropical crops, the methods adopted for their cultivation in different parts, and the manner of preparing the produce. The sugar-cane naturally receives first attention, and the different systems of cultivation which prevail in Louisiana, Cuba, Hawaii, and Porto Rico are all described. Reference is made to the number of varieties of cane which are in existence, and to the production of seedling canes at Barbados and Demerara. No description is, however, given of the milling of the canes and the subsequent processes in the manufacture of sugar. The chapters following describe, in order, the cultivation of the grain crops of the South (rice, maize, etc.), the pasture and forage crops, the fibre plants—including sisal and cotton—tobacco, coffee, cacao, and rubber, as well as of both tropical and subtropical fruits. A feature of part II is the account that is given at the close of each section, of the insect and fungus enemies of the various crops dealt with.

Professor Earle's book is clearly written and contains a number of illustrations; it should be of special value to students in agricultural schools, while planters in Central America and in the West Indies may read it with interest and profit.

CINNAMON OIL INDUSTRY IN THE SEYCHELLES.

The possibility of the profitable establishment of an essential oil industry in the Seychelles Islands has long been under experimental consideration, and about two years ago, the idea was first put into operation on a commercial scale, when a modern factory provided with a boiler and a still of 4,000 litres capacity was erected.

In 1906, work was started by the distillation of citronella and lemon grass, but owing to the late fall in price of the oils obtained from these two grasses, it was decided in 1907 to make cinnamon oil the chief product of the factory for the present.

The cinnamon grown in the Seychelles (*Cinnamomum Zeylanicum*) is the same variety as that cultivated in Ceylon. Oil is yielded by the roots, the bark and the leaves of this plant, but that from the bark is the most valuable of the three products. The trees are cut down periodically, and the bark from which the oil is distilled is obtained from the young shoots arising from the stumps. These shoots are available for the purpose in about two years. It is not only the young shoots, however, from which bark is obtained yielding the cinnamon oil. This is contained in the same proportion by the bark from older trees, and tall trees about 1 foot in diameter are said to yield as much as 100 lb. of dry bark, when cut down. The average tree, however, does not give more than about 20 lb. of dry bark. This contains from 9 to 9·4 per cent. of cinnamon oil.

Samples of oil produced in the Seychelles by water distillation about two years ago were forwarded to Europe and valued at about £2 6s. per litre (a litre being approximately $1\frac{3}{4}$ pints). It is anticipated, however, that with the improvements in the product brought about as the result of the establishment of the new factory, a higher price will be obtained in future, and the industry placed upon a sure footing.

EXPERIMENTAL CULTIVATION OF FODDER CROPS AT DOMINICA.

Much trouble is frequently experienced by stock-keepers in the various West Indian Islands during the dry season owing to the lack of an adequate forage supply for their animals, particularly milch cows. This has been especially noticed in St. Vincent, Dominica, Grenada, and Barbados, and therefore the experiments with a number of fodder crops, which were started two years ago on the land cultivated in connexion with the Dominica Agricultural School, should ultimately give valuable assistance to stock-keepers in the island by indicating the crops that may with most advantage be planted with the object of providing a supply of green fodder during the dry season.

The experiments were started in 1906 when four crops were under trial viz. : Bascom Guinea corn, Improved Bascom Guinea corn, Jerusalem corn, and Guinea grass. In 1907, the experiment plots were increased to twelve and the new crops included in the experiments consisted chiefly of a number of varieties of sorghum and imphee, viz : Early Amber Sugar-cane and Early Orange Sugar-cane (Imphees or varieties of *Andropogon sorghum*, var. *saccharatus*) : 'Rural branching Doura,' and 'Yellow branching Doura,' 'Red Kaffir corn,' and 'White Kaffir corn,' the last four all being varieties of *Andropogon sorghum*, var. *vulgaris*, together with teosinte, Para grass, and *Melinis Minutiflora*.

These crops were all sown during August. A satisfactory rainfall was experienced during the following three months, and the crops grew so well that a first reaping was made early in November. A good weeding and mulching of the plots was then made, and about the third week in January, a time when fodder usually begins to be scarce in Dominica, a second reaping was available. The soil upon which these fodders were grown was comparatively poor, being of a light sandy texture, and deficient in organic matter. On the whole, all the crops under trial gave very good results during the season 1907-8, with the exception of the Jerusalem Corn, and failure in this case was due to the fact that the seeds were destroyed by ants after sowing. With the exception of this crop, yields at the rate of from 4 to 5·3 tons per acre were given at the second reaping, and, speaking generally, a quantity only slightly less was obtained at the first cutting. It will be seen therefore (basing our assumption on the yields of the past season) that if three harvests per year are taken with these fodder crops, planters might expect yields of from 12 to 15 tons per acre of green forage, while if four reapings were made, which in the case of many of the crops, it is not unreasonable to expect, the annual yield of fodder per acre will reach from 16 to 20 tons.

In Mr. Brooks' report on these experiments, he mentions, in reference to the two varieties of imphee ('Early Orange' and 'Early Amber Sugar-cane') under trial, that germination took place very rapidly and fairly strong plants were produced. The yield per acre from the second reaping was 4·6 tons in the case of the Early Amber variety, and 5·2 tons in the case of the Early Orange variety. The 'Doura' plants also grew well, but it is mentioned, that they were dwarfed in size compared to some of the other fodders under trial. The 'Rural branching' Doura gave at the rate of 4·2 tons per acre, and the 'Yellow branching' Doura at the rate of 5·3 tons per acre in the second reaping. As already mentioned, the Jerusalem corn gave but a small yield of fodder in the past season. In the report of 1906-7, however, it is mentioned that this plant can be strongly recommended for very dry situations. Guinea grass gave a yield at the rate of 4·3 tons per acre on the second reaping, and, as is well-known, this crop will give many reapings during the year. Bascom Guinea corn gave at the rate of 4·3 tons per acre, and the report states that in past years it has proved a most reliable fodder crop during the time of drought.

The Red and White Kaffir corn germinated fairly well, and both varieties are mentioned as being specially suited for poor lands. The Red corn gave at the rate of 4 tons per acre, and the White 5·2 tons per acre on the second reaping.

The three remaining crops under trial, viz.: teosinte, Para grass, and *Melinis Minutiflora*, have not yet been under cultivation long enough to give a reaping, but in every case the plants are mentioned as being in good condition. Teosinte is described as a plant which promised to be one of the most useful fodders that can be cultivated in Dominica.

SISAL HEMP CULTIVATION IN THE BAHAMAS.

The Bahamas form the chief British colony in which Sisal hemp (*Agave rigida*, var. *sisalana*) is produced, although in the West Indies, a remunerative and developing industry in the cultivation of the product exists in the Caicos Islands, a dependency of Jamaica (see *Agricultural News* of March 7 last, p. 79), and efforts have been made to start a sisal industry in Jamaica itself. Of late years the cultivation of the plant has been under experiment in India, and sisal fibre of the finest quality has been produced both in British and German East Africa. The following notes on the sisal hemp industry in the Bahamas appeared in the Report for 1907 of the Board of Agriculture of the colony :—

The most important industry in the Bahamas is the raising of sisal fibre, used for making binder-twine, ropes, bags, mattings, brushes, etc. Its profits can be judged from the prosperity of the Out Islands of the Bahama group. Unaffected by heat, drought, storm, or insects, the sisal crop is certain, and the price is staple. The Bahama fibre is said to be of superior strength. Its annual yield is variously estimated at from £3 to £10 per acre.

The estimated area under sisal cultivation is considerably over 25,000 acres. The output exceeds that of previous years, and the acreage is increasing especially in the Out Islands.

From the beginning of the year up to the end of October there was a good demand for fibre, and good prices were obtained ; at the end of October a financial crisis was experienced in America, with the result that prices for fibre fell away considerably ; at present the price is about 2c. per ℔. less than at the beginning of the year.

The exports of sisal fibre for the financial year 1905-6 were 3,040,045 ℔., valued at £37,522. For 1906-7 3,867,034 ℔., valued officially at £40,140, were shipped—an increase of 826,989 ℔. over the exports of the previous year. Taking the average price as a basis, the actual return obtained for the year's crop was £56,394, a much larger figure than that given in the Blue Book.

Other countries are coming to the front with the sisal fibre industry, which makes it more and more important that no efforts should be spared to improve the Bahamas product. The Hawaiian Islands, Porto Rico, Mexico, and other countries are setting to work with a will to develop a fibre industry, and vast quantities of fibre are produced and coming forward for the American market.

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice market during the month of September:—

Very little can be said about any improvement in trade connected with spices and drugs during the month of September. It was anticipated that with the passing of the summer holidays, the shortening days of September would see some sort of revival in trade generally. Nothing of the kind, however, has been experienced during the greater part of the month, though in the last week a slightly better tone prevailed, which was somewhat counteracted by the abnormally fine and summer-like weather, accompanied by an exceedingly high temperature, causing people to revert not only to summer clothing, but to summer habits generally.

GINGER.

The spice sales commenced on September 2 with an offering of only 54 barrels of Jamaica, a few of which realized 57*s.* 6*d.* per cwt. for good common. Small rough washed Cochin sold at 34*s.* and fair limed Japan at 28*s.* A week later Jamaica was in small demand with slow sales: the better kinds were disposed of at cheaper rates, but there was no change with the common. The following were the quotations: Good to fine, 65*s.* to 72*s.*; middling to fair, 57*s.* to 63*s.*, and ordinary to good ordinary, 53*s.* to 55*s.* Out of 576 packages offered, only 60 were disposed of. Wormy washed Cochin was sold without reserve at 30*s.*, and small limed slightly mouldy Japan fetched 28*s.* per cwt. At the third auction on the 16th, there were moderate supplies offered, small sales only being effected at easier rates, and at the last sale the whole tone of the market was very quiet, there being no Jamaica offered. Two hundred packages of Calicut were bought in at the following prices: Good cut, 90*s.*; small, 85*s.*; and medium, 55*s.* Thirty-five bags of limed Japan were also bought in.

NUTMEGS, MACE, AND PIMENTO.

At the first sale there was a good demand, 311 packages of West Indian, all that was offered, being sold with quick demand at ½*d.* per lb. advance on previous rates. On the 23rd, West Indian nutmegs were again in good demand: 427 packages were offered, and practically all sold at higher rates; 109 boxes of Singapore were also offered and about half were disposed of at previous prices. Steady rates have also been obtained for mace. At the first auction on the 2nd, 15 packages of West Indian realized 1*s.* 4*d.* per lb. for fair palish; 1*s.* 1*d.* to 1*s.* 2*d.* for reddish, and 11*d* to 11½*d.* for broken. On the 23rd, 98 packages of West Indian were offered and nearly all sold at somewhat advanced rates, namely—1*s.* 4*d.* to 1*s.* 6*d.* for palish to pale: 1*s.* 2*d.* to 1*s.* 3*d.* for pale to reddish, and 1*s.* to 1*s.* 1*d.* for dark-red and pickings. But a little interest was taken in pimento at the beginning of the month. On the 16th, some 21 bags of fair were bought in at 2¼*d.* per lb., and on the 23rd, only 2 bags were offered and sold at easier rates.

ARROWROOT.

At the spice auction on the 9th, 55 barrels of St. Vincent were sold, out of a total of 182 barrels offered, at 1⅝*d.* to 2⅛*d.* per lb. A week later 783 barrels of St. Vincent were brought forward and bought in at 2⅛*d.* to 2¼*d.* per lb.

SARSAPARILLA.

At the first drug auction on the 3rd of the month, it was announced that important arrivals of this drug had taken place, including grey Jamaica, red native, and Lima-Jamaica. Grey Jamaica and Lima were both offered at the auction in the following week, namely on the 9th, but no native. Of the first, namely, grey Jamaica, 43 bales were put up and all sold at 1*d.* per lb. cheaper rates. Fair grey fetched 1*s.* 6*d.*, fair but part coarse 1*s.* 5*d.*, and ordinary coarse 1*s.* 4*d.* per lb. Seven bales of Lima-Jamaica were disposed of at 1*s.* 3*d.* to 1*s.* 4*d.* per lb. for grease damaged to fair rolls. On the 24th, 11 bales of genuine grey Jamaica were sold at 1*s.* 5*d.* per lb. for very coarse and damaged, and 1*s.* 6*d.* for barely fair. Eleven bales of native Jamaica were also disposed of, common mixed fetching 9*d.*, dull red 10*d.*, fair red 1*s.*, and good red 1*s.* 2*d.* per lb.

KOLA, LIME JUICE, OIL OF LIME.

Twenty-eight packages of Ceylon kola were offered in the middle of the month; 1 barrel part mouldy fetched 1*d.* per lb., and 27 bags fair, rather dark and occasionally defective, realized 1¾*d.* per lb. At the auction on the 9th, 2 casks of brown West Indian lime juice reported to contain 'much suspended vegetable matter' were sold without reserve at 2*d.* per gallon. It was stated at this sale that 116 packages of concentrated, and nearly 300 packages of raw lime juice from Dominica had arrived. On the 23rd, 5 cases of West Indian distilled oil of lime were offered and held at 2*s.* 6*d.* per lb. It was stated that the arrivals included 39 packages from Dominica.

POSSIBILITIES OF RICE CULTURE IN BRITISH HONDURAS.

The conditions which exist in many parts of British Honduras are undoubtedly eminently favourable for rice growing, and it is hoped that in the future, this industry will be successfully developed. At present, however, the amount of rice produced in the colony is insufficient to meet the local demand. The Belize *Clarion*, referring to this subject in a recent issue, says:—

> The advisability of giving more attention to rice cultivation in British Honduras has been repeatedly pointed out, and it has been demonstrated that the crop will be a success in the colony.
>
> The output of rice, however, is less to-day than it was ten years ago, which is due to the abandonment of the small cultivations along the Sibun and Manatée Rivers, the principal sources of supply in the past. The sons of the old settlers who worked these plots prefer town life, or wood-cutting.
>
> As in the case of British Guiana, which has turned its attention to rice growing with such marked success, there exist in British Honduras thousands of acres of river-bank lands, unfitted for anything else but the cultivation of rice, which might prove a source of wealth to the owners, if this cereal were planted on them, instead of allowing them to lie idle and useless, as at present.
>
> Under favourable conditions the cultivation of rice on a large scale offers a better return to the capitalist than the planting of rubber or cacao, because the returns are more certain and expeditious, and the market almost unlimited. A company formed to start rice growing in British Honduras would, we are confident, meet with every success. It would be found that in a very short time, plots of rice, worked by small cultivators, would start up adjacent to the fields of the company, and the latter would find an additional source of revenue from milling the grain produced by the small holders.

MARKET REPORTS.

London,—October 27, 1908, The West India Committee Circular; Messrs. Kearton Piper & Co., October 27, 1908, Messrs. E. A. de Pass & Co., October 16, 1908.

Arrowroot—Quiet; 2½d. per lb.
Balata—Sheet, 2/1 to 2/5; block, 1/7½ to 1/8.
Bees'-wax—Good quality, £7 12s. 6d. to £7 15s. per cwt.
Cacao—Trinidad, 54/- to 67/- per cwt.; Grenada, 46/- to 56/- per cwt.
Coffee—Santos, 24s. to 24s. 3d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £18 10s. per ton.
Cotton—St. Vincent, 17d., and Barbados, 14d.; West Indian, good medium, 6·20d.; West Indian Sea Island, good medium to medium fine, no quotations.
Fruit—
Bananas—Jamaica, 4/6 to 6/- per bunch.
Limes—Not wanted.
Pine-apples—St. Michael, 2/- to 4/6.
Grape Fruit—10/- to 12/- per box.
Oranges—Jamaica, 7/6 to 9/6 per box.
Fustic—£3 to £4 per ton.
Ginger—Quiet.
Honey—Dark liquid, 21s. 6d. per cwt.
Isinglass—West India lump, 1/4 to 2/4 per lb.
Lime Juice—Raw, 11d. to 1/3 per gallon; concentrated, £15 17s. 6d. per cask of 108 gallons; distilled oil, 2/2 per lb.; hand-pressed, 4/6 to 5/- per lb.
Logwood—£3 to £4 5s. per ton; roots, no quotations.
Mace—Steady; no quotations.
Nutmegs—Quiet.
Pimento—Quiet.
Rum—Jamaica, 1/6 to 3/4, Demerara, no quotations; Trinidad, no quotations.
Sugar—Crystals, 15/6 to 16/9 per cwt.; Muscovado, no quotations; Syrup, 12s. 3d. to 14s. 3d.; Molasses, no quotations.

New York,—October 30, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12¼c. to 13c.; Grenada, 11½c. to 12⅜c.; Trinidad, 12¼c. to 14c.; Jamaica, 9c. to 10½c. per lb.
Cocoa-nuts—Jamaica, select, $28·00 to $29·00; culls, $15·00; Trinidad, $28·00 to $29·00; culls, $15·00 per M.
Coffee—Jamaica, ordinary, 7¼c. to 7½c.; good ordinary, 7¾c. to 8¾c.; washed, 9c. to 11½c. per lb.
Ginger—10¾c. to 12½c. per lb.
Goat Skins—Jamaica, 53c.; Antigua and Barbados, from 49c. to 51c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 48c. per lb., dry flint.
Grape Fruit—Florida, $4·00 to $5·00 per barrel; $2·00 to $2·75 per box.
Limes—No quotations. Market over-stocked.
Mace—28c. to 32c. per lb.
Nutmegs—110's, 9½c. per lb.
Oranges—Florida; $3·50 to $4·50 per barrel; $2·00 to $2·50 per box.
Pimento—3⅜c. per lb.
Sugar—Centrifugals, 96°, 3·98c.; Muscovados, 89°, 3·48c.; Molasses, 89°, 3·23c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., November 2, 1908; Messrs. Leacock & Co., November 9, 1908; Messrs. T. S. Garraway & Co., November 9, 1908.

Arrowroot—St. Vincent, $4·50 per 100 lb.
Cacao—Dominica and St. Lucia, $13·00 to $14·00 per 100 lb.
Cocoa-nuts—$13·00 for unhusked nuts.
Coffee—Jamaica and ordinary Rio, $8·50 to $10·50 per 100 lb.
Hay—$1·25 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·50; loose, $2·00 per 100 lb.
Potatos—Nova Scotia, $2·00 to $2·16 per 160 lb.
Peas—Split, $6·50 per bag of 210 lb.; Canada, $3·75 per bag of 120 lb.
Rice—Ballam, $4·80 (180 lb.); Patna, $3·50, Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana.—Messrs. Wieting & Richter, October 31, 1908; Messrs. Sandbach, Parker & Co., October 31, 1908.

Arrowroot—St. Vincent, $9·00 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—96c.
Cassava Starch—$6·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb.
Dhal—$5·25 to $5·40 per bag of 168 lb.
Eddoes—$1·20 per barrel.
Molasses—No quotations
Onions—Madeira, 2⅛c. to 2¼c.; per lb.
Plantains—12c. to 20c. per bunch.
Potatos—Nova Scotia, $2·25 per 100 lb.
Potatos—Sweet, Barbados, $1·32 per bag.
Rice—Ballam, $6·00 to $6·25; Creole, $4·75 for good; Seeta, $6·00.
Split Peas—$7·00 per bag (210 lb.); Lisbon, no quotations.
Tannias—$1·44 per bag.
Yams—White, $1·92; Buck, $2·40 per bag.
Sugar—Dark crystals, $2·15 to $2·25; Yellow, $2·80 to $3·20; White, $3·50 to $3·70; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
——Cordwood—$2·40 to $2·64 per ton.

Trinidad,—October 31, 1908.—Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·25 per fanega; Trinidad, $12·00 to $12·60.
Cocoa-nuts—Selected, $23·00 per M., f.o.b.
Cocoa-nut Oil—65c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. per lb.
Copra—$3·00 to $3·15 per 100 lb.
Dhal—$4·50 to $4·80 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·40 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $4·50 to $4·80 per bag.
Split Peas—$6·25 to $6·50 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

A FORTNIGHTLY REVIEW
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IMPERIAL DEPARTMENT OF AGRICULTURE FOR THE WEST INDIES.

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The Testing of Seeds.

SEED-TESTING is an important branch of economic botany, and the many stations which exist for this purpose in Europe and America are of great service to agriculture in the countries in which they are situated. At most of these stations purchasers of farm and garden seeds may have the genuineness, purity, and germinating power of samples thoroughly tested for a small fee.

In the West Indies, many of the chief crops such as sugar-cane, provision crops, etc., are raised by cuttings, grown by the planter himself, or obtained either from a neighbour or the Botanic Station of the island. Where crops are grown from seed, as in the case of cotton or maize, this seed is either produced at home, or care is taken to get it from a reliable source, and there is no doubt as to its genuine nature, even though its germinating power is not known. Under these circumstances, therefore, the need of a seed-testing station is not so much felt as in many other countries.

Conditions are different in England and other European countries, and in the United States. The chief agricultural crops in those parts of the world, e.g., wheat, oats, maize, beet, turnips, swedes, clover, grass seeds, peas, beans, etc., are all produced directly from seed, which in the great majority of cases, is purchased by the grower in the open market. The source of the seed, as well as its age and character, are necessarily unknown to the purchaser, except in so far as they are guaranteed by the salesman, and the value of an institution which will rapidly test the samples of seed submitted, and furnish an independent report on their character has long been recognized.

Seed-testing, as now understood, was first started about forty years ago, when the first station was established in Germany. A book, dealing with the fraud and deception regularly practised in the seed trade, and the consequent loss suffered by agriculturists, was published (also in Germany) a few years later, and this led to vigorous action. Seed-testing stations were started in a number of countries, mostly under Government control, and at the present time there are over 150 in existence. A Government Station was started in Ireland in 1901, which is doing an excellent work. The samples tested in the first year numbered 488; in 1907 they had increased to 1,460, while the total number of samples reported from the beginning of the work to the end of 1907 was nearly 7,000. Farmers are charged only 3*d.* for each sample of seed reported upon.

Since this subject is one of general importance to agriculturists, a few notes on the qualities which characterize a good seed, and the methods followed in ascertaining these points, may not be without interest.

In estimating the value of seed the qualities tested are the genuineness, purity and germinative power. A sample is genuine when, on examination, it turns out to be really the kind described by the seed merchant, and not a seed similar in appearance but of inferior worth. There exist several instances in which the seeds of one species of European grass so nearly resemble those of another species, that the aid of the microscope is often required to distinguish the difference. This also applies to one or two crops other than grass. In such cases it is obvious that the seller is under considerable temptation to substitute the cheaper, more easily obtained seed for the dearer and better kind. The seed-testing station is the means of protection for the purchaser.

In testing the purity of a sample of seed, the quantity and kind of foreign matter present is investigated. The two chief sources of impurity are inert matter, such as stones, particles of soil, broken seeds, stalks, etc., and the seeds of other plants, chiefly weeds. The purity of a seed is a very important consideration, as the presence of impurities is the cause not merely of a diminished yield, but is also responsible for the spread of weeds. Great improvement has of late years taken place in this branch of the seed trade, and elaborate machinery now exists by means of which the impurities are removed. The process followed in testing the purity of a seed is quite simple. A definite weight of an average sample of the bulk is taken, the impurities of the two kinds mentioned are separated out, weighed, and expressed as a percentage.

The germinating power of a seed sample is a third and most important point to be tested. The seed from which the impurities have been removed is taken, and from it a definite number, which usually varies from 200 to 400, is separated without selection, and placed under suitable conditions of temperature, moisture, and air, for germination. A porous plate, thick folded blotting-paper, folded flannel, layers of sand or even garden soil in a saucer, are all utilized, under different circumstances, for testing germination, and they constitute the 'seed-bed.' The seeds are spread on the seed-bed (between the layers of flannel or blotting-paper if either of these is used), care is taken to ensure a sufficient supply of moisture, while 20° C. (68° F.) may be taken as a suitable temperature.

In the *Agricultural News*, Vol. II, p. 153, and Vol. V, p. 58, a simple method of testing the germinating power of seeds is described, which may be adopted at home by any one. A dish half full of water is taken, and over this is placed another dish of porous clay, with its rim resting on that below, and its under surface in contact with the water. The seeds to be tested are placed on the porous dish, which should be kept in a shady spot.

Under the conditions described, all the seeds capable of germination will have sprouted at the end of a certain time, which is known generally for each kind of seed. Germination which is slow and irregular compared with the average for the kind of seed under consideration indicates poor vitality. The riper and more perfect the seed, the more uniformly and quickly will it germinate. Each day the seeds which have sprouted are counted, and from the total number which have sprouted at the end of the time limit, the germination percentage is calculated. These tests show that one-year old seed is, in the majority of cases, the best to sow. From two years on, seeds lose their vitality by degrees.

What is known as the 'true value' of a seed depends both on the percentage purity and the germinating power, and these two characteristics must be considered together in reporting on the quality. To get at the true value, the numbers representing the percentage purity and the germinating power respectively, are multiplied together and the product divided by 100. On this basis it will be seen that the true value of a sample of onion seed showing 90 per cent. purity and 80 per cent. germinating power, is 72: that is, every 100 lb. contains only 72 lb. good seed.

Oils Seeds in India. A writer in a recent number of the *Indian Review* estimates that about 2,500,000 tons of oil-bearing seeds are annually produced in India, of which the most important are sesamum (gingelly), linseed, rape, cotton, ground nut, castor-oil seeds, and cocoa-nut. About 6,000,000 gallons of oil, and 1,000,000 tons of raw products are annually exported from the country. The benefit that would accrue to native stock-keepers if the oil were expressed in India before export, and the residual cake used as a stock food is pointed out by the writer.

SUGAR INDUSTRY.

Seedling Canes at Jamaica.

A second report of the Sugar-cane Experiment Station at Jamaica, which was started in 1904, has just been issued by the Hon. H. H. Cousins, M.A., Island Chemist. This report covers the work done both in the field and the laboratory during the two crop seasons of 1906 and 1907. It includes the results so far obtained in manurial trials, as well as in the tests with different varieties of cane under trial at the Station and on estates. Particulars are also given of investigations carried out in connexion with the Jamaica rum industry. For the purpose of estate trials with seedling and other canes, tops have been distributed to a number of estates in different parts of the island. In the past two years these estates numbered twenty-four, but reliable returns were obtained from only seven estates in 1906 and nine in 1907. Based on these returns, the outstanding results of these estate trials as given in Mr. Cousins' report are as follows:—

Seedling B. 208 has, on the whole, proved itself the best variety yet tested on an estate scale in Jamaica. It has given gratifying results on light soils under irrigation or on heavy cane lands and in the mountain cultivations of the peasantry. So marked are the good qualities of this cane that 83,000 tops of this variety, out of a total of about 90,000 tops distributed by the Station in 1907, have been supplied to the estates. Although B. 208 does not give so rich a juice in Jamaica as it does in Barbados, it gives a big yield of cane, and its sturdy, upright habit is a feature that marks it out as peculiarly fitted for cultivation under irrigation.

B. 147 has been tried fairly extensively by estates and found, as a rule, a cane of somewhat 'tricky' character. It has, however, so deep-rooting a habit of growth, that it has shown itself a splendid cane on the heavier soils of Trelawny and outclassed all other canes in a season of trying drought. The glucose ratio of the juice is apt to be high, but on an estate making a good rum this can hardly be considered as a matter for regret when the price of muscovado sugar is as low as it is at present.

D. 95 has proved itself a good cane, particularly on light soils with irrigation. Until we received the new seedling B. 1,529, which has the sweetest and most concentrated juice of any variety ever tested in Jamaica, D. 95 has always headed all other canes in the richness and quality of its juice. Some estates have found D. 95 a useful variety for giving ripe canes at the beginning of crop owing to its early maturation. It is, however, rather a delicate cane and is sadly liable to leaf-rust on some soils, and is quite incapable of resisting any stagnation of soil-water. The so-called 'D. 95' canes of Albion estate that achieved such excellent results on that estate have proved on trial at Hope to be D. 99 and D. 135—the former a green cane, the latter a red one. To the latter variety, D. 135, and not to the real D. 95, must be attributed the fine return of 3 tons of sugar per acre obtained by Albion estate in 1901, to which reference has often been made in Jamaica.

Of new canes, D. 625 and D. 1,438 are of decided promise and are receiving attention for estate trials. It is disappointing to find, however, that the severe drought of 1907 has shown that D. 625 is quite unable to withstand such adverse conditions.

The White Transparent is a better cane than the old Black cane of Trelawny or the Ribbon cane. It gives juice of good quality, yields a good proportion of tops, and ratoons well. Its defects are a liability to lodge, and an agricultural yield that is capable of being improved on by selected seedling canes.

Selections from our own Jamaica seedlings are now being tested on estates. At the Central Station, they outclass all other canes in clean, vigorous growth, and, if their early promise be maintained, should afford valuable canes for estate use. The severe drought through which we have passed during the present year 1907, has shown that some of our own seedlings have extraordinary vigour and power of resistance to dry weather.

Developing Cane-sugar Industry in Natal.

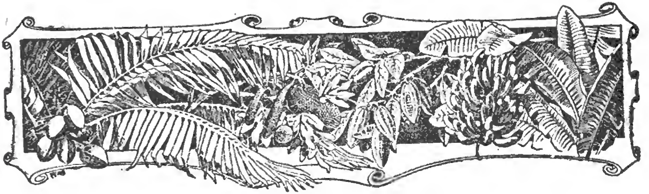
Sugar-cane cultivation has been carried on in the coast districts of Natal for the past twenty-five years, although until ten or fifteen years ago the methods employed were very primitive. Considerable improvements have of late been introduced, and the sugar-producing industry has grown to be one of importance. Practically the only variety of cane planted is that known as the 'Yuba' or 'Uba,' which is also successfully cultivated in Madeira. It has not done so well in Mauritius or Louisiana. The 'Yuba' is described as a deep-rooted, green, woody cane of great vitality.

The area in Natal that was planted with sugar-cane under European management, was 40,022 acres in 1906. There are no native plantings of any consequence. The entire coast district of the colony is stated to be suited to cane culture, as the soil is fertile and the rainfall sufficient. At least two crops of ratoons are grown, in addition to the plant cane crop. The cane grows to a medium size, and the average yield of sugar per acre from all the lands harvested was 1·7 tons. On the best-conducted plantations the yield is somewhat greater. A good deal of molasses and syrup is manufactured from the Natal cane crop, in addition to sugar.

The methods of cane cultivation practised are being rapidly improved, according to the United States Consul at Durban; modern mills and a completely equipped refinery are taking the place of the out-of-date plants on several properties, while all the old plantations are being improved, and new machinery substituted for that formerly used.

The Consul estimates the total amount of capital invested in the Natal sugar industry at $7,300,000, of which $2,750,000 represent the value of machinery and plant. The proportion of foreign capital in the industry is quite small. The great bulk of the machinery in the factories is British-made.

Practically all the work on the Natal plantations is done by indentured Indians, since white labour is too expensive The total number of persons of all races employed in the cane mills and plantations in 1906 was 7,565. Of these, only 203 were white.



WEST INDIAN FRUIT.

EXPERIMENTS IN FRUIT EXPORT FROM HAWAII.

With the increase in fruit production in the Hawaiian Islands efforts are being made to find profitable markets for the produce, and experiments in shipping pine-apples, mangos, bananas, avocado pears, and papaws to the Western States of America have been in progress for some three or four years.

The pine-apple is the chief fruit produced in the Hawaiian Islands, and nearly 3,000 acres have come under cultivation with this crop in the past few years. In the shipment experiments, the pine-apple is the fruit which is receiving the principal attention.

The trial exports of fruit have been attended with such a measure of success as to warrant the hope that the trade may undergo considerable developments in the near future. The question of shipment of the different fruits under refrigeration, and under ventilation respectively, is discussed in a report lately issued by the Agricultural Experiment Station of Hawaii. Refrigeration is demanded by avocados, mangos, and papaws, when under transport by sea, and the trials so far made, indicate that a temperature of from 40° F. to 50° F. is the most suitable for this class of fruit. The pine-apple may be shipped without refrigeration, while its employment is not at all adapted to the banana.

If fruit is to be shipped without refrigeration, it is pointed out that the primary essential is ventilation of the space in which it is stored during transport. Next to ventilation, dryness, reasonably low temperatures, and careful handling are important for preserving the fruit in good condition. Crates of pine-apples and bananas have been successfully carried on the decks of steamers, ventilation being ensured by strips of board placed between the crates.

A sample shipment of fruit consisting of a car-load of pine-apples, and avocado pears, was despatched under refrigeration from Honolulu on August 14, 1907. This reached San Francisco on August 21, where the fruit was examined, repacked in a refrigerated car, and sent forward by rail to Chicago, which was reached on August 31. Unpacking did not take place until September 3. A careful examination showed that notwithstanding the fruit had been under transport for nearly three weeks, the avocados were in good condition for immediate consumption, although they were not so firm as they should be for the market. They had not deteriorated during the journey overland, however. The pine-apples opened up in excellent condition, the total loss being less than 1 per cent., although it was reported that some of the fruits showed more or less discoloration in ripening. The author of the bulletin points out, that the results of this trial shipment suggest that under proper conditions of transport, Hawaiian fruit may find its way to a more extensive market than that furnished by the Western States of America alone, and that it may possibly be sent to any part of the United States or Canada.

The variety of pine-apple largely grown in the Hawaiian Islands is the Smooth Cayenne, and it is a kind of very good flavour, although it does not ship so well as the Red Spanish pine, which is so generally grown in Florida, Cuba, and Jamaica. The pine-apple needs very delicate handling if it is to be shipped abroad, and liberal amounts of packing material should be used. The length of stem attached to pine-apples on sending them off was seen by experiment to have an influence on their keeping properties. The fruits with stems from 2 to 3 inches long kept much better than those with stems only 1 inch or less in length. Fruits cut with long stems, and also wrapped in paper, showed an average saving of 22·37 per cent. of the whole over fruits cut with short stems and packed without paper.

Two varieties of banana are grown in Hawaii—the Canary (*Musa Cavendishii*), and the Bluefields banana. Bunches of the latter variety are always shipped abroad without any packing or covering, but just as they are gathered from the tree. The Canary bananas are wrapped in dried banana leaves or dried grass, although this method of packing is regarded as being unsatisfactory, and it is suggested that some other mode of protection of the fruit during transit should be adopted. In the United States, a cylindrical package, known as a 'banana drum' is coming into use in despatching the fruit from one part of the country to another. These drums are of heavy pasteboard or strawboard, with three hoops, and have a thin wooden bottom. A lining of thick wrapping paper is inserted, which extends about a foot above the top of the drum. The bunch of bananas is placed within the drum, and the paper tied about the stem, which thus makes a convenient handle for lifting the package.

Avocado pears, as already mentioned, demand refrigeration in shipment but are not a difficult fruit to export, with due care in picking and packing. The best results in the Hawaiian experiments were given when the pears, carefully picked, were wrapped separately in paper and despatched in crates, containing only a single layer of the fruits. It is most important that avocados should be got into refrigeration immediately after packing. First class avocados in good condition fetch a price of $2·50 per dozen on the San Francisco market, and if they are firm and of good quality there is no difficulty in disposing of them.

THE AFRICAN OIL PALM AND ITS PRODUCTS.

The well-known Oil Palm of West Africa (*Elaeis guineensis*) has a wide geographical range, for it flourishes from the Gulf of Guinea to the south of Fernando Po, as well as in the islands of Zanzibar and Pemba, and along the shores of the Central African lakes. Of all the vegetable products of the countries on the West Coast, the *Elaeis guineensis* is undoubtedly the most important to the native. The fruit supplies him with a favourite article of food and forms the chief article of commerce; with the leaf-stalk he builds his house and barn, and thatches them with its leaves, and from the stem he extracts a pleasant and (sometimes) intoxicating drink.

During 1907, the total value of the palm oil and kernels exported from Southern Nigeria alone was £2,972,252. In the same year the oil and kernels shipped from the Gold Coast were valued at nearly £221,290, this being an increase of over £15,000 on the exports of the preceding year. Supplies of palm oil have also lately been exported from the Philippine Islands.

In all the above-mentioned countries from which the produce is shipped, the oil palm is indigenous and occurs naturally over enormous areas. Little expense is incurred in looking after the trees, and the oil must be regarded as more or less a natural forest product. No authentic information has been placed on record in regard to any systematic planting and cultivation of the oil palm which may have been made in Southern Nigeria or elsewhere, or to the average returns that may be expected from such plantings.

It seems reasonable to expect, however, that if plantations of the palm were established in many tropical colonies, the production of the oil would prove a valuable industry. It would be a matter for experiment to determine whether the cultivation would be as remunerative in any given district as rubber or cacao planting. Some thirty or forty years ago an estate owner in British North Borneo who had considerable faith in the profitable possibilities of oil palm cultivation planted a fairly large area. The trees grew well, but by the time they were nearing the productive age, the ownership of the estate changed hands, and the new proprietor cut down the young palms in order to make room for some other product.

The African oil palm has been acclimatized in Jamaica and some of the other West Indian Islands, where groups of the trees are frequently to be met with. Little or no use, however, is apparently made of the nuts, and so far as is known, no attempt has ever been made to cultivate the palm in regular plantations.

The oil palm reaches a height of 30 or more feet. In the course of a report on the oil industry of the Gold Coast which appeared in the *Kew Bulletin* for 1889 (p. 190) it is stated that the tree grows best in a moist soil, flourishing in warm damp valleys. It begins to bear in its fourth or fifth year, the produce increasing until its fifteenth, and continues to bear for at least sixty years. A tree produces, on the average, from four to seven bunches of fruit every year.

The fruits have a fleshy fibrous outer layer from which the palm oil of commerce is prepared. This layer covers a hard-shelled nut from the kernel of which a white oil known as 'palm nut oil' is produced.

A very full and illustrated account of the methods in use at Lagos for extracting palm oil appeared in the *Kew Bulletin*, 1892, (p. 200). From this it appears that the fruits are boiled in earthenware pots until they form an oily mass. This is transferred to a wooden trough where it is left over night to cool. In the morning the mass is covered with cold water, and the natives pound the oil out of the nuts with their bare feet. The oil gradually rises to the surface, from which it is skimmed, and passed through a sieve to remove the coarser impurities. It is then poured into a pot and clarified by further boiling. This palm oil is chiefly used in the manufacture of soap and candles.

The kernels of the nuts from which the white oil is prepared, are frequently exported whole to Europe, after the shell has been removed by the natives. The 'kernel oil' is expressed by hydraulic presses, and has a number of uses, one of which is in the manufacture of margarine or artificial butter. The resulting cake is used as a cattle food.

According to the *Kew Bulletin* a single tree may yield from 1 to 3 gallons of oil per annum, depending on the character of the soil and the rainfall. The price of palm oil on the London market is from £14 to £15 per ton.

If fuller and reliable data could be obtained from Southern Nigeria on such points as suitable distance in planting, the time and money required to bring a plantation of oil palms into full bearing, the average yield of nuts per tree, and of oil per acre, together with the net profit that might be expected per acre over a given period, these details would be of the utmost value to enterprising planters in other tropical colonies who may be thinking of taking up the cultivation.

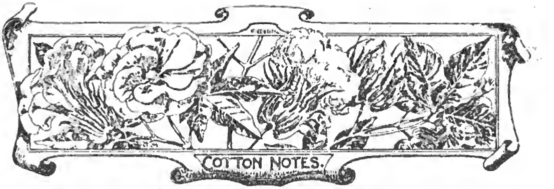
AGRICULTURE AT THE GOLD COAST.

The chief agricultural products of the Gold Coast in order of value are cacao, rubber, and palm oil and kernels from the oil palm, together with such minor articles of produce as kola nuts, copra, cotton, etc.

The cacao industry of the Gold Coast is of especial value, and it is noteworthy that its development is quite recent. In 1895, the cacao shipped from the colony was no more than 28,906 lb. Five years later the shipments had advanced to 1,200,749 lb.; in 1905 they reached 11,407,608 lb., while in 1907 the exports of cacao from the Coast were 20,956,400 lb., valued at £515,089. The latest *Annual Report* on the colony mentions that considerable improvement has lately been shown in the cultivation of the cacao plantations.

The rubber exported from the Gold Coast is practically all produced from wild *Funtumia elastica* trees. Rubber planting is being encouraged by the Government, and distributions of seed of *Hevea brasiliensis* (Para rubber) are annually made. This tree is said to flourish at the Botanic Stations in the colony, and to produce an abundant supply of seed. In 1907, 3,549,548 lb. of rubber, valued at £333,120, were exported from the colony. This shows a slight decrease, compared with the shipments of 1906. As the result of a Commission appointed to enquire into the methods of tapping and preparation practised by the native rubber producers, a scheme has been formulated whereby a number of travelling instructors are to be appointed, whose duties will be to instruct the natives in more scientific methods of cultivation, tapping, and general preparation of the rubber.

The total value of the products of the oil palm shipped from the Gold Coast in 1907 was £221,290. This included 1,867,945 gallons of oil, valued at £119,468, and 9,753 tons of kernels, valued at £101,822. The exports of palm oil show a small decrease, and this is referred to in the *Annual Report* on the colony as a sign of the increasing attention that is being given to cacao.


COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of November 9, with reference to the sales of West Indian Sea Island cotton:—

About 250 bales of West Indian Sea Islands have been sold since our last report, at fairly steady prices. They include about 100 St. Kitt's at 13*d.* to 14½*d.*, 50 St. Vincent at 14*d.* to 16*d.*, and 50 Montserrat at 12*d.* to 14*d.*

The stock of Fine Crop Islands held in Charleston all through last season is rather a depressing feature in the market, but on the other hand Florida cotton, which has recently been selling at 10⅝*d.*, has advanced to 11⅜*d.*, and graded Carolina Island cotton is selling freely on the basis of 12¾*d.* for 'Fine' and 13¾*d.* for 'Fully Fine.' This latter is stronger in staple than the bulk of the West Indian cotton still remaining on hand, and is consequently being purchased in preference at the moment.

We are inclined to the opinion that the market will go no lower, and with an improvement in trade, it would advance.

BARBADOS CO-OPERATIVE COTTON FACTORY.

The sixth report of the Barbados Co-operative Cotton Factory, dealing with the working during the year ended September 30 last, was recently submitted to the shareholders, and adopted. The results for the year are considered very satisfactory. The following form the chief points in the report:—

After deducting the cost of materials, labour, expenses of management, etc., the net profit for the year amounts to $8,490·28, which together with the balance brought forward from September 30, 1907, makes a total of $12,670·21.

Of the above sum, the Directors have given $170·00 as a bonus to the staff of the factory. They recommend that the remaining $12,500·21 be appropriated as follows:—

(1) That a dividend at the rate of 12 per cent. be declared, equal to 28·8c. per. share, and amounting to $3,690·14.

(2) That $1,000 be transferred to the Reserve Fund, increasing this to $4,000.

(3) That 2 per cent. of the cost of the factory buildings and plant, amounting to $602·30, be written off.

(4) That a bonus, at the rate of 4c. per 100 lb. of seed-cotton, be given to those persons who have sent cotton to the factory to be ginned and shipped on their account. This will absorb $927·24.

The eight gins which were not in place at the end of the last half-year have been erected, and the factory is now fully equipped.

GRADING OF COTTON.

The picking season has now begun throughout the West India Islands, and planters are again recommended to be most careful with their crop.

Proper picking bags should be supplied to all the pickers, and all dirty or stained cotton should be kept separate from the clean cotton, as it is picked in the field.

The first cotton to burst is always weak, and should be kept apart from the main crop. It should be put on one side until the end of the first picking, and the cotton last gathered—which is also of an inferior character—may be added to it. On no account should the cotton obtained at the beginning and at the end of the picking be mixed with the main crop, nor should stained cotton be allowed to be mixed with the finer qualities. When mixed cotton is sent for sale on the English market, the price obtained is based on the value of the worst quality cotton in the bale, but if it should by accident be paid for as first quality cotton it will only arouse suspicion against the estate mark, and perhaps against the whole cotton crop shipped from the particular island. Several complaints have recently been made by buyers in England of mixed cotton, and therefore planters are advised to be particularly careful during the present season. The main bulk of first pickings should alone be shipped as first quality, while the beginning and end of the picking should be shipped as second grade. Stains should be shipped by themselves. The estates can easily keep those portions of their cotton crop separate, but this is almost an impossible matter after it has been sent to the ginnery. Some of the cotton factories in the West Indies attempt to undertake the sorting of badly graded cotton, but this can never be so successfully accomplished as upon the estates themselves, and therefore planters are strongly urged to pay particular attention to grading their produce before it is sent to the factory.

In those islands where second and third pickings are obtained, planters are advised to keep those pickings separate from the cotton obtained at the first picking. It has been found that the cotton of the first picking is longer and finer than that of the second, and it also has a better lustre and natural twist. Second picking cotton contains less weak fibre than first picking, but is more brittle. It is generally shorter and lacks lustre. Third picking cotton has a large proportion of weak fibre and is very wasty.

In order, therefore, that the high position West Indian cotton has gained upon the market may be maintained, it would be well if the several pickings should be kept entirely separate, and shipped as different grades. It is more than probable that estates which attend carefully to this matter would soon establish a reputation for their mark, and thereby command a slightly higher price, than that of the general market.

COWPEAS AND VELVET BEANS FOR GREEN MANURING.

The attention of West Indian planters has more than once been drawn by means of notes or short articles in the *Agricultural News*, to the value of the cowpea crop for green manurial purposes, but it may be worth while to give a few more particulars on the subject, that have been abstracted from the pages of Professor Earle's book '*Southern Agriculture*,' which was reviewed in the last issue of this journal:—

In considering the crops suitable for green manuring, Professor Earle lays special stress on the value of the cowpea and the velvet bean. The cowpea is referred to as the most important leguminous crop for use in the Southern States. It is a rank-growing annual, completing its growth in about three months. Being of tropical origin, it delights in hot weather and does not succeed well during the cooler months. Its short-growing season makes it possible to grow it as a manurial crop during the limited period when the ground is unoccupied, previous to planting sugar-cane, for instance. It is most widely used in the Southern States, however, to plant between the rows of corn at the time when the last cultivation is being given to this crop. Louisiana planters are also recommended to sow crops between the rows of sugar-cane at the beginning of the rainy season. It is doubtful, however, if such a practice can be recommended on the thin soils of Barbados and some other of the West Indian Islands, especially in seasons which are deficient in rainfall. The peas are frequently sown broadcast at the rate of from 3 pecks to 3 bushels of seed per acre. When planted in drills, however, about 3 feet apart, only about one-half of such seed is required.

Cowpeas make a rank growth even on very poor lands if supplied with a manure of potash and phosphoric acid. As they belong to the Leguminosae they have the power of assimilating nitrogen from the atmosphere, and the good results obtained in this way have been very noticeable. For this reason the crop is frequently used to build up and enrich worn out soils in the Southern States of America. The Whip-poor-will or Speckled cowpea is especially mentioned as an early maturing variety which is particularly useful when land can be occupied only for a short time. The Iron cowpea produces a large amount of vine and leaves, and is mentioned as being suitable for West Indian conditions.

In reference to the velvet bean, Professor Earle states that in districts where it succeeds well, this must be considered as a formidable competitor with the cowpea for first place as a soil improvement crop. It cannot, however, be used interculturally among other crops as can the cowpeas, but must occupy the ground alone. When land can be given up to a soil-improving crop for from four to five months during the summer, no other crop will produce so satisfactory results in the way of securing nitrogen, smothering foul weeds, and adding humus to the soil. It thus adapts itself perfectly to the needs of winter truck growers in Southern Florida and the tropics, and for use in Cuban tobacco fields, since in Cuba, tobacco is strictly a winter (dry season) crop and the land, as a rule, lies idle during the summer.

It is also an invaluable plant in preparing the land for permanent crops like fruit orchards or sugar-cane.

What clover is to agriculture of the North and the cowpea is to the cotton belt, the velvet bean is destined to be for the tropics, where the need for a much greater use of soil-improving plants is so imperative.

Like the cowpea, velvet beans may be sown broadcast or planted in drills; in nearly all cases the latter is preferable, since one or two cultivations give them a chance to get ahead of weeds and grass. When they once begin to run, no further attention is needed, since they quickly climb up, and by their weight bend over and drag down, any chance weed that happens to spring up among them.

When green, velvet bean vines are not at first particularly relished by stock, but a taste is soon acquired for them: the partially ripened pods however, furnish very rich pasturage. The vines, if cut and cured into hay, are eaten readily and are very nutritious, but they are so long and tangled that they are difficult to cut and handle.

INDIAN AGRICULTURAL DEPARTMENT.

The Director of Agriculture, Bombay, (Mr Henry S. Lawrence), in the course of a lengthy paper, entitled 'Indian Agriculture' which was reprinted in the *Tropical Agriculturist* (February, March, and April last) gives an account of the establishment, organization, and work of the Department of Agriculture for India. This paper, from which the following details as to the system of organization, etc., have been abstracted, forms an interesting record of the many and useful lines of activity of the Department:—

A Department of Agriculture was first established in India in 1870, but was closed nine years later, on account of financial pressure. In 1896, however, the Department was re-established, and at the commencement, valuable work was done in the preliminary study of agricultural conditions in India, compilation of agricultural statistics, etc. In 1902, a body of scientific workers was first appointed in connexion with the Department.

At the head of the work is the Inspector-General of Agriculture in India, whose functions are to advise the Government on all agricultural questions, to superintend the work of the Research Institute that has been established at Pusa in Bengal, and to observe, and, as far as possible co-ordinate, the operations of the several provincial departments.

The Research Institute at Pusa, a Station at which much valuable work is being done, is described as being primarily connected with 'the solution of the fundamental problems of tropical agriculture.' The staff comprises European scientists in agricultural chemistry, botany, entomology, mycology, horticulture, and plant physiology, and a number of native assistants in these sciences.

There exists also a sub-Department of Agriculture for each Province, in charge of a Director, whose duty it is to adminster the work, and interpret its teaching and results to landowners and cultivators. The Director also advises the provincial Government on agricultural matters.

Agricultural Colleges have now been established in practically every province of India. The educational work of these institutions is subject to the supervision of the Directors of Agriculture, while the executive work of the various Experiment Stations in each province is supervised by the Deputy-Director of Agriculture—a European agricultural expert. The programme of agricultural experiments is drawn up by this officer in consultation with the Professor at the College, and is subjected to criticism by the Board of Agriculture of India before being put into operation.

It will be seen therefore, that the Indian Agricultural Department is certainly working under a good system of organization.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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Agricultural News

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NOTES AND COMMENTS.

Contents of Present Issue.

The methods adopted in testing agricultural seeds for genuineness, purity, and germinating power are described in the editorial.

In trials with seedling canes on Jamaica estates, B. 208 has proved especially satisfactory. B. 147 and D. 95 have also done well, particularly on soils of a certain character. The sugar industry in Natal is becoming of increasing importance (page 371).

Experiments carried out in the Hawaiian Islands indicate that not only pine-apples and bananas, but also avocado pears, papaws, mangos, etc., can, under suitable conditions, be satisfactorily shipped to the United States (page 372).

An article summarizing the chief points in regard to the African Oil Palm and its products is given on page 373. Another article, dealing with the 'mahoganies' of commerce, appears on page 382.

Cotton Notes (page 374) include market reports, a reprint of the chief points in the report for the past year of the Barbados Cotton Factory, and a brief article on Cotton Grading.

Interesting notes on the use of cowpeas and velvet beans for green manuring, and the methods of cultivation of these crops, will be found on page 375.

Under Insect Notes (page 378) two articles appear, which deal respectively with white ants and with cattle ticks.

Cyanogenetic Glucosides in Plants.

The experiments in progress at the Agricultural Research Institute, Pusa, India include the cultivation, under varying conditions, of a number of kinds of plants known to form cyanogenetic glucosides in considerable amount at certain stages of growth, with the object of discovering the conditions, which control or influence the quantity of glucoside formed by the plant. Cyanogenetic glucosides are compounds which under suitable conditions undergo a change that results in the production of prussic acid. Such compounds exist in small quantity in numbers of plants, and reference has frequently been made in past numbers of the *Agricultural News* to the presence of a prussic acid producing glucoside in immature sorghum, and it is for this reason that the consumption of green sorghum by cattle has sometimes been attended with fatal results.

The experiments at Pusa have led to the conclusion that the formation of the cyanogenetic glucoside in a given variety of plants is not a distinct feature of the variety, for instances of the same variety forming much glucoside, or none at all, respectively, under different conditions have been met with. It is hoped that by carefully controlling the conditions of growth, the cause of formation of the glucoside may be isolated. Dr. Leather states that the work, so far, has been attended with a certain measure of success.

Agriculture in British Guiana.

Some interesting items of information are given in the section relating to Agriculture of the British Guiana Blue Book for 1907-8.

The area under sugar-cane cultivation in the colony is 77,967 acres, this being slightly less than the sugar acreage of last year. The total area under crops other than sugar-cane, (including 3,838 acres on sugar plantations) is 62,271 acres. Of this, rice is planted on 29,624 acres. It is seen, therefore, that the whole of the cultivated land in British Guiana is no more than 140,238 acres. There are forty-seven estates on which sugar is manufactured. The area devoted to farmer-grown cane is increasing; in December last it was estimated at 2,500 acres. The cacao, coffee, cocoa-nut, and plantain estates number about seventy-one, the areas devoted to the first three of these crops being 1,761, 991, and 7,022 acres respectively. Maize, bananas, plantains, and ground provisions account for 13,326 acres, while the total area so far granted for rubber cultivation amounts to 4,000 acres. About eighty-five cattle farms also exist in British Guiana.

Details are given as to rate of wages for agricultural work in the colony. Cane-cutters earn from 1*s.* 6*d.* to 3*s.* 6*d.* per day, this work being always done by task. Industrious blacks and coolies prefer task work to day work on estates, and as shovel-men or suppliers they earn from 1*s.* to 2*s.* per day, and as weeders from 10*d.* to 1*s.* 6*d.* per day. The sugar manufacture work is principally done by East Indians. Cane throwers earn from 1*s.* 2*d.* to 1*s.* 8*d.*, firemen and sugar curers from 1*s.* 4*d.* to 2*s.* 6*d.*, and head clarifiers from 2*s.* to 2*s.* 6*d.* per day.

Increasing Orange Production in Cuba.

The orange industry of Cuba is almost entirely controlled by Americans, and a great deal of attention has of late years been paid to the question of increasing the output. The variety of orange chiefly planted in Cuba is said to be Hart's Late, while the Pine-apple, Parson Brown, and Washington Navel kinds are also very popular. The United States Consul at Cienfuegos, in a recent report, states that systematic orange cultivation in Cuba did not begin until about eight or nine years ago, and must at present be regarded as being only in a very early stage of development. In the near future it will probably undergo great expansion. The Cuban orange crop for this season is expected to reach 500,000 crates, which is the largest in the history of the island. Imports of the fruit from California and Florida have rapidly declined of late years.

Sunflower Cultivation.

The sunflower (*Helianthus annus*) is cultivated on a considerable scale in Russia, Hungary, Italy, and Germany, as well as in parts of India, for the sake of the oil contained in its seeds, and the cake left after extracting the oil is used for cattle. The sunflower grows well in the West Indies, although it has never been cultivated as an economic crop. The plant needs a good well-manured soil to give the best returns. About 12 lb. of seed are sown per acre, in rows 3 to 3½ feet apart. When the plants are well formed they should be thinned out to distances of 12 to 18 inches apart in the row. The general method of cultivation of the crop resembles that practised in the case of maize. The plants take about three months to mature. When grown for seed, the best results are obtained by limiting the number of seed heads formed on each plant. The yield of seed may be from 8 to 15 cwt. per acre. The price of white sunflower seed on the London market is 17*s.* to 19*s.*, while that of black seed is 13*s.* to 14*s.* An analysis of an average sunflower seed cake shows that this contains 34·66 per cent. of nitrogenous matter, and is at least equal to linseed cake for feeding purposes.

Crops and Manures at Martinique.

While there was a considerable advance in the value of the cacao shipments from Martinique during 1907 the sugar exports were less than usual, owing partly to reduction of the area under cultivation, and partly to drought.

In 1906 the sugar exports were 42,230 metric tons (1 metric ton = 2,200 lb.), valued at £438,048, while in 1907 they fell to 36,922 metric tons, of the value of £379,800. Owing to remunerative prices, rum is being produced in increasing quantity at Martinique. A considerable amount of molasses is being imported from Guadeloupe, as the local supply is insufficient to meet the requirements of the distilleries. The rum exports from Martinique during 1907 show an increase of 319,246 gallons in quantity, and £35,634 in value, as compared with those of 1906.

Cacao cultivation is being slowly extended in the island. The quantity of cacao shipped abroad in 1907 was 1,106,136 lb., or an advance of 65,763 lb. on the exports of this product in 1906. The increased value, however, was £20,204. Coffee was exported to the quantity of 8,587 lb., while 171,499 lb. were imported.

Martinique imports considerable quantities of artificial manures. In 1907 the chief manures of this kind brought into the island were superphosphate, 2,803 tons: nitrate of soda, 1,129 tons: sulphate of ammonia, 828 tons: nitrate of potash, 748 tons; and sulphate of potash, 141 tons.

West Indian Bulletin.

There has just been issued a new number of the *West Indian Bulletin*, viz., No. 3 of Vol. IX. This includes several papers relating to the cotton industry of the West Indies, read at the Agricultural Conference of January last. Mr. J. R. Bovell deals with cotton cultivation at Barbados, while Dr. Francis Watts, C.M.G., and Mr. W. N. Sands contribute papers in which the progress made in the Leeward Islands and at St. Vincent, respectively, is discussed. Dr. Watts also has a second paper on cotton seed selection as practised in the Leeward Islands, while the general progress of the cotton industry in the West Indies is discussed in an interesting article by Mr. Thomas Thornton, A.R.C.S. There is also included a paper by Mr. H. A. Ballou, M.Sc., dealing with the treatment of cotton pests in the West Indies.

The rice and rubber experiments in progress in British Guiana are dealt with in two papers by Professor Harrison, C.M.G. A lecture on the geological formation of Barbados, delivered during the Conference, is also reprinted in this number of the *Bulletin*. A few short papers on general subjects, e.g., the production of essential oils, vegetable ivory, etc., conclude the number.

Rice Production in British Guiana.

From the official returns lately issued it is seen that the rice area of British Guiana underwent further extension in the year 1907-8, when 29,624 acres were planted with the crop in the colony. In 1905-6 the area was 23,853 acres, and in 1906-7 it advanced to 26,567 acres. The chief rice districts are East Coast and Canje Creek, Corentyne Coast, and West Coast, in Berbice, where together about 11,000 acres are planted: Essequibo River, North Essequibo Coast, and South Essequibo Coast, with about 6,200 acres: and Abary, West Coast, East Coast, and Mahaica, in Demerara, which districts, taken together, have about 9,500 acres under the crop. In 1906-7, the rice exports from the colony were 3,474,512 lb. In the following year the shipments reached 6,977,877 lb. (an increase of 100 per cent.), and were valued at £39,879 18*s.*

The harvest season for the present year (1908-9) is very nearly over, and practically all the paddy has been gathered in. The area planted is greater than that of last year, but Messrs. Sandbach, Parker & Co., in a late report, mention that the average return per acre is lower than in 1907, and with increased consumption in the colony, it is likely that there will be little advance in the rice exports for the season.

INSECT NOTES.*

The White Ant (*Termes flavipes*, Koll.).

Insects of the family Termitidae, the family to which the 'white ants' belong, feed on wood and dead vegetable matter, and live socially in mixed colonies of sterile and fertile individuals. The term 'white ant,' by which these insects are known, is entirely inappropriate in so far as it indicates any relationship with the true ants, as they are not ants, but belong to the order Isoptera, being closely allied to the book-lice.

The popular acquaintance with the termite is derived from seeing it on its nuptial flight when the small, brown, winged insects emerge from crevices in buildings and ground. These are the colonizing forms, and not the ones which actually do the damage, for the real depredators are the soft-bodied, large-headed, milky white soldiers and workers. No insect occurring in houses is capable of doing greater damage than *Termes flavipes*, and since their entrance to buildings is effected by soil channels, and their work cannot usually be detected before considerable damage has been done, not only their eradication, but their detection is a difficult matter.

In every colony there are four forms: males, females, soldiers, and workers. The males have a pair of compound eyes placed just above the antennal fossae, and when young, two pairs of large membranous and approximately equal wings, projecting beyond the apex of the abdomen when at rest. They live permanently with the females. The females when young closely resemble the males, but later, when they become mothers of colonies, this resemblance is not so close. The soldiers are sterile, wingless, and usually blind. Their heads are chitinous, strong, and peculiarly adapted for defence. They act as protectors of the colony, although occasionally assisting the workers. The workers are sterile, wingless, usually blind, but little chitinized, having short and powerful jaws, and larval in appearance. They attend to all the duties of the colony, such as building the nests, caring for the young, and ministering to the wants of the queen. All except the migratory winged forms are incapable of enduring sunlight, as the soft delicate bodies of the other forms shrivel when exposed, and, consequently, all their operations are done under shelter.

At the time of the nuptial flight, the winged forms emerge in pairs, and, under favourable conditions, each pair may establish a new colony, but as they are preyed upon by many insectivorous animals, this rarely happens. As soon as a king and queen have established a new colony, they superintend the rearing of the first brood of workers and soldiers until these are able to assume their special duties in the colony. Henceforth, the queen loses all power of locomotion, is constantly fed by the workers, and her size increases considerably. She now becomes an egg-laying machine, laying many thousands of eggs per day. When any accident befalls the queen, a 'supplementary queen' is developed from a very young larva, being smaller, however, than a true queen, but serving the purpose of egg-laying equally as well.

As so many of the colonizing forms are destroyed during their nuptial flight, the more usual rule of the formation of a new colony is the splitting up of old colonies. As methods of prevention, and remedies against white ants, the following may be mentioned:—(1) Coat all foundation timbers with tar. (2) Build the foundations of buildings entirely of brick, stone, or concrete. (3) Fumigation with hydrocyanic acid gas at the strength of 1 oz. of potassium cyanide per 100 cubic feet of space. (To make this gas, the required number (x) of ounces of potassium cyanide is weighed out; to this is added twice the number ($2x$) of fluid ounces of sulphuric acid, and four times the number ($4x$) of fluid ounces of water.) Fumigate in a tight room to which access cannot be gained during the operation as the gas is a most deadly poison. After the room has been closed, put the acid and water into an *earthenware* vessel and drop into it the cyanide contained in a bag attached to a string which runs freely through a key-hole. After fumigation has gone on from one to two hours, open the room from the *outside* and allow it to air for not less than six hours before entering.

The Cattle Tick (*Boophilus annulatus*).

Texas fever (known also as splenetic or tick fever) is a disease caused by a microscopic organism which lives in the blood and destroys the red corpuscles of the animal attacked. In sucking blood from fever-infected, or immune animals (i.e., those animals which have had an attack of Texas fever and recovered therefrom), a number of the germs is necessarily withdrawn by the tick, along with the blood. When the female tick deposits eggs, the germs pass into the eggs and later into the 'seed-ticks' hatching from these eggs. As soon as these 'seed-ticks' get upon a bovine animal and begin the blood-sucking process, the germs of the fever pass from them into the system of the host animal, resulting in an attack of fever.

The presence of the germ is not necessary to the development and reproduction of the tick, but the tick is an absolutely necessary agent for the transmission of Texas fever from one animal to another.

Life-history and Distribution. The cattle tick being a parasite derives its food entirely by sucking blood from the animal—cow, ox, calf, deer, and occasionally horse and mule—to which it is attached. The female tick on reaching maturity, releases her hold upon the animal, drops to the ground, and after from two to five days begins egg-laying. The deposition of eggs is continued for eight to fifteen days, each female depositing between 1,500 to 4,500 eggs during this period, after which she dies.

The eggs thus deposited on the ground hatch in from seventeen to twenty-five days, and as soon as they have left the egg-shell, the young ticks or 'seed-ticks' crawl up the blades of grass and collect together near the top. On coming into contact with a passing animal, the seed-ticks select suitable positions, insert their mouth-parts, and commence sucking blood. Growth of both males and females at this time is rapid, and the insects moult twice during their growth. The expansion of the abdomen of the females, in part due to the formation of eggs, takes place after the second moult. The male ticks do not become nearly so large as the swollen females, and may be easily mistaken for partly-grown females. In from twenty-one to forty-five days, depending on the condition of the host, the growth of the female is completed.

For a very long time this cattle tick has been known to inhabit Europe, Africa, India, Borneo, South and Central America, Mexico, Texas, and the West Indies.

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* The Insect Notes in this number, as in the last issue of the *Agricultural News*, were contributed by Mr. C. C. Gowdey, B.Sc., who has for a short time past been attached to the Imperial Department of Agriculture as Honorary Assistant Entomologist.

STUDENTS' CORNER.

Seasonal Notes.

NOVEMBER.

1st FORTNIGHT.

The planting of sugar-cane will be under consideration. Observe the methods followed in your neighbourhood and compare them with those followed in other countries. Study the manner of preparing the 'plants'; notice whether care is taken to select healthy plants; note the use of Bordeaux mixture; study the growth of the young plants.

In the reaping of the cacao crop observe the changes taking place during the fermenting of the beans; give attention to questions relating to drying the cacao.

When limes are being reaped observe the quality of the fruit; note the proportion of rotten or damaged fruit and try to ascertain the causes. Note the density of the juice as shown by a hydrometer (see *West Indian Bulletin*, Vol. V, p. 236).

Cotton picking will be in progress. Observe any pest or diseases which interfere with the proper development of the bolls. Look for bushes showing desirable qualities for seed selection. The use of Paris green for caterpillars is sure to be in evidence; study the question of applying this to advantage.

2nd FORTNIGHT.

Planting of canes will be in progress. Note the proportion of plants which fail to grow and try to ascertain the reasons why they fail. Study the questions bearing on weeding, surface tillage, dust mulching and kindred matters.

In cacao fields, consider the manner of the disposal of old shells of cacao pods and see how this may bear on cacao diseases.

When lime juice is prepared, take notes of the manner of concentrating the juice; study the use of the hydrometer in this connexion; find how much raw juice it takes to produce a gallon of concentrated. (See *A B C of Lime Planting*, p. 34, and *West Indian Bulletin*, Vol. V, p. 236.)

When cotton picking is in progress, note the quantity of lint given by the first developed bolls and those coming later. Learn to judge the quality of lint by systematically pulling it from the seed: the officers of the Botanic Stations will assist in showing how this is done. Observe any pests occurring on cotton and study their life-history.

QUESTIONS FOR CANDIDATES.

PRELIMINARY QUESTIONS.

(1) By shaking up with water and washing, separate the sand from the clay in a weighed sample of soil in your neighbourhood, and state the type of soil you consider it to be.

(2) Ascertain, by means of an acid, if the soil in your neighbourhood is calcareous.

(3) Make a tracing of a map of the district in which you live, and mark upon it the kinds of soil existing there, distinguishing calcareous from non-calcareous, light from heavy, and other similar points of difference.

INTERMEDIATE QUESTIONS.

(1) Why is the draining of soil necessary? Discuss the question of draining in relation to the soil in your neighbourhood.

(2) What crops are useful as green dressings? Compare leguminous and non-leguminous crops in this connexion.

(3) Describe in detail how you would prepare and 'green dress' a field to be ultimately planted with sugar-cane.

ACCLIMATIZATION OF PLANTS.

An interesting *Circular* of the Royal Botanic Gardens, Ceylon (Vol. IV, No. 9) deals with the acclimatization of plants in Ceylon and other countries.

The term *acclimatization*, it is pointed out, is frequently confused with the *introduction* and *naturalization* of plants. When a species becomes so adapted to a new climate as to be able with ordinary care to thrive and perfectly reproduce its kind, it may be said to be *acclimatized*. An introduced plant is *naturalized* when it has become independent of artificial aid of any kind, escapes from cultivation, and thrives in a wild state. An example of this in Ceylon is the cashew nut (*Anacardium occidentale*).

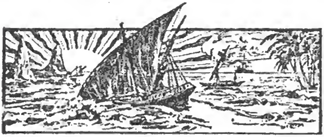
The principal factors concerned in acclimatization are climate and the physiological variability of the plant. Cultivation, however, exerts a very great influence, and it is by this means that nearly all our industrial or economic plants have been so modified and improved to suit our requirements. The tendency of the plant constitution is to readjust itself to environments, as upon the harmony between these and its own organism depend its periodicity and reproduction, which are the essential functions of plant life.

The time required to effect naturalization varies with the constitution of the plant and the extent of the change experienced. In some cases a certain number of generations of the plant may be required to effect perfect adaptation to a new climate, while in others a species will at once establish itself and even show a great increase in fertility. The reproductive or fruiting period is another important factor in acclimatization. Species in which this is prolonged are most readily acclimatized, their reproductive fertility often enabling them to increase at a very rapid rate.

Ceylon owes a great deal to plants which have been introduced and naturalized, as few of the leading products are from plants native to the island. The chief estate products of Ceylon as tea, coffee, cocoa-nuts, rubber, etc.; the choicest fruits; the best shade trees and timbers, as ebony and satinwood; the finest flowering trees; the chief vegetables and the best fodders, have all been obtained from other countries. Camphor, it is mentioned, has not yet become acclimatized in Ceylon, although trees have been grown at Hakgala under most favourable conditions for thirteen years. Para rubber, on the other hand, rapidly adapted itself to the climatic conditions of the island after the importation of the first supply of plants in 1876, and now seed of *Hevea brasiliensis*, grown in Ceylon, is being supplied in quantity to planters in Brazil, the native home of the tree.

The benefits of acclimatization, it is pointed out, are not entirely confined to the old world. America is indebted to the Eastern Tropics for many of her leading products, as for example, coffee from Abyssinia, sugar-cane from China, ginger (now practically a monopoly of Jamaica), and rice (a staple food product of the Southern States), both from India, not to speak of mangos, oranges, grapes, and other useful products of the East.

The acclimatization of weeds is referred to, and it is mentioned as a curious fact that the most worthless plants are generally the most readily acclimatized. The worst weeds of Ceylon as the 'goat weed' (*Ageratum conyzoides*), which in the past is said to have cost coffee planters in the island £250,000 a year to keep in check; the Lantana weed, and the so-called sensitive plant (*Mimosa pudica*), as well as several others were all introduced from foreign lands. Other plants mentioned which have proved expensive pests on acclimatization in different countries are the Prickly Pear in Queensland, and the Water Hyacinth in Florida.



GLEANINGS.

The Agricultural Instructor at Nevis reports that heavy rains were experienced over the island on November 1. From 2·5 to 6 inches of rain fell in different parts.

The United States Consul at Calcutta in a recent report comments upon the increasing cultivation of ground nuts in Burma. The area devoted to this crop in 1903 was no more than 3,800 acres, but in 1907 it had increased to 80,000 acres.

The export of kola nuts from the Gold Coast of Africa increased in value from £73,632 in 1906 to £78,901 in 1907, while the shipments of copra have similarly advanced from a value of £4,290 in 1906 to £6,186 in 1907.

The total rainfall at St. Lucia during 1907 was 71·33 inches, this being 10·51 inches below the fall of 1906. Rain fell in the island on no less than 275 days. The maximum rain on any one day was 1·98 inches on October 19.

The fourth annual sale of live stock was held at the Government Stock Farm, Tobago, on November 25. The list of animals offered for sale comprised fifty-six lots, including a number of half-bred Zebu cows and heifers, three bulls, four calves, together with pigs and poultry of various breeds.

For the year ending March 31, 1908, the exports of live stock from British Guiana were as follows: 1,438 horned cattle valued at £5,622 10*s.*; 772 pigs valued at £587 4*s.*; 49 donkeys valued at £90; 201 goats valued at £78 6*s.*; 160 sheep valued at £75; 2 horses valued at £38, together with poultry to the value of £129.

The cultivation of bananas in Egypt has been attended with success, and yet, notwithstanding this fact, the fruit is annually imported to the value of £13,000. The Egyptian Government, through the Agricultural Society, is endeavouring to remedy this state of affairs, by the propagation of large quantities of banana plants for the supply of cultivators anxious to start plantations. (British *Consular Report.*)

With the object of securing reliable information as to the possibilities of agricultural development in Mexico, the Government of that country commissioned a foreign expert to investigate agricultural conditions in various tropical and subtropical countries. According to the latest report of the British Consul-General at Mexico City, this expert has recently returned, and now advises the Government to establish a Mexican Department of Agriculture. He urges that Mexico has special advantages for the growing of tea, cacao, rice, and fruit of many kinds.

An official return issued on October 2 last, by the Cuban Department of Agriculture places the total 1907-8 sugar crop of Cuba at 985,711 tons as compared with 1,452,049 tons in 1906-7. The number of mills working in 1907-8 was 168, while 184 were in operation in the previous year. While the total weight of cane ground was 15,431,180 tons in 1906-7, it was no more than 10,198,965 tons in 1907-8.

For the encouragement of school gardens in Jamaica the Governor of the colony has sanctioned the award of a number of prizes to be made at the end of the present year. These awards consist of seven first prizes of £5 and seven second prizes of £2, a first and second prize respectively to be given in each of the seven districts of the island supervised by one of the School Inspectors.

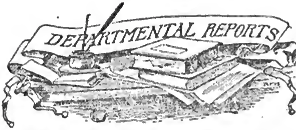
Three Botanic Stations in a good state of efficiency have existed for some time at different parts of the Gold Coast Colony, West Africa. A new station for the Central Province has lately been established near Cape Coast, and a considerable area planted with cacao, rubber, and other products. Large quantities of seeds and plants are distributed from each Station, while valuable instruction is given to native cultivators by the Curators and their assistants.

According to the *Nairobi Pioneer*, the experimental cultivation of belts of citronella grass along the edges of the great lakes and on the banks of the rivers in Uganda, has given satisfactory results in keeping down the growth of scrub and bush, among which the tse-tse fly abounds, and under the shade of which it breeds. The citronella grass grows rapidly, and soon covers the ground. It is stated that neither tse-tse flies nor mosquitos are found on these grass areas.

Attention is drawn in the report (1907-8) of the British Consul at Tamsui, Formosa, to the enormous benefit that would result to large areas in the island if a proper system of irrigation were established. It is stated that the output of sugar might be increased sevenfold, so that all the quantity required by Japan could easily be supplied. The productivity of the present rice area could also be increased from 50 to 75 per cent., and an additional 100,000 acres brought into cultivation.

Referring to the camphor-producing industry of Ceylon the Planters' Association of the island report that the old methods of obtaining this product have been abandoned as being wasteful and uneconomical. The camphor is distributed throughout the whole system of the tree, and can therefore be obtained from leaves and twigs as well as from the wood of the stem. A method of cultivation which will result in the maximum production of leaves and twigs is therefore being aimed at.

A letter in the *West India Committee Circular* of October 27 last draws attention to the harmful effects exercised on the Jamaica orange trade in England by the shipment, in August and September, of consignments of immature fruit of poor quality. This practice, it is stated, has been general with a number of Jamaica orange growers for several years in spite of warnings as to the unwise nature of the policy. The low quality of the early produce prejudices dealers against the bulk of the crop which comes on later.



BARBADOS: REPORT ON THE AGRICULTURAL AND BOTANICAL DEPARTMENTS FOR THE PERIOD 1898 TO 1907. WITH A REVIEW OF THE SUGAR-CANE EXPERIMENTS SINCE 1884.

As indicated by the title, this report, besides dealing with the experimental work that has been carried on with sugar-cane, cotton, bananas, and other crops under the Imperial Department of Agriculture during the period 1898 to 1907, includes a short historical account of the sugar-cane experiments since 1884. It briefly sets forth the various efforts that have been made to improve and develop agriculture at Barbados from 1886 to 1907. There is also a general account of agricultural education in the primary and secondary schools of the island. The report, which is illustrated with a number of reproductions of photographs, is similar in style to the Botanic Station Reports for 1906-7 issued by the Imperial Department of Agriculture.

The sugar-cane experiments at Barbados commenced in 1884, when ten varieties of cane were received from Jamaica. Local varieties were also included in the trials, together with nine kinds of cane from British Guiana. The raising of canes from seed commenced in 1889, and since then the production of seedling canes and the testing of their economic value have formed a large portion of the work of the Agricultural and Botanical Departments.

An account is also given of the establishment and subsequent conduct of the manurial experiments with the sugar-cane at different stations in the island. These experiments have been carried on under uniform conditions since the 1892-4 season, and the average results are briefly set out in the report.

Since 1898, the sugar-cane experiments have been carried out under the direction of the Imperial Department of Agriculture, and with the increased funds available, it has been possible to greatly develop and extend the scope of the work. The young seedling canes are raised in an irrigated field at Dodds Station, and the more promising of these are distributed throughout the island for trial under estate conditions. Since 1898, nearly 30,000 canes have been raised from seed, and are in various stages of the process of testing. As is well known a number of these canes have shown improved sugar-yielding power, together with an increased capacity for disease resistance as compared with the parent varieties, and are being planted over increasing areas each year in the island. It is hoped that the experiments, started in 1904, in which seedlings are raised by means of cross-pollination, effected by hand, and in which the parent plant on each side is known, may be the means of more surely and rapidly producing improved varieties.

The manurial trials, started at Dodds, have been continued by the Department, and in addition, other manurial trials have been conducted on typical black- and red-soil estates, through the kind co-operation of owners and attorneys.

Details are given of the establishment and progress of the cotton industry at Barbados. Some 16 acres were grown experimentally in 1902. As the result of the visit made by Sir Daniel Morris and Mr. J. R. Bovell to the Sea Islands of Carolina in the following year, a large quantity of the best Sea Island cotton seed was purchased for use in the West Indies, and in the 1903 season, the cotton area of Barbados increased to 800 acres, while the total value of the exports of lint and seed from the island was £13,143. The progress has been rapid and continuous and the cultivation of cotton has proved a valuable adjunct to the sugar industry. In 1906-7 an area of 5,000 areas was planted with this crop, while the total value of the cotton exports was estimated at £76,376. The cotton industry is one which, since its inception, has received special help and encouragement from the Imperial Department of Agriculture, while the assistance given by the British Cotton-growing Association in loaning machinery in the first instance, and in providing for the services of a Travelling Inspector in connexion with Cotton Investigations has been of the greatest value.

The efforts made to encourage other subsidiary agricultural industries at Barbados are also referred to in the report. Considerable attention was given to banana production in the island, with the object of establishing an export trade to England in this fruit. The exports increased from 18 bunches in 1902 to over 40,000 bunches in 1905. Difficulties of shipment arose in the following year, however, owing to lack of room in cold storage, and the trade unfortunately declined.

The experimental cultivation of onions, various leguminous crops, etc., was also instituted by the Imperial Department with the object of furthering the agricultural interests of the island, while funds have been provided for holding local Agricultural Shows for peasant and small proprietors.

It will also be seen from the report that agricultural education at Barbados has been furthered by the provision of a Lecturer in Agricultural Science, whose whole time has been devoted to teaching Natural and Agricultural Science, by Agricultural Exhibitions tenable for two years at Harrison College, by lectures to Elementary School teachers, by gifts to Elementary Schools, and by prizes for school children at the local Agricultural Exhibitions held every year under the auspices of the Department.

RICE DRYING IN BRITISH GUIANA.

The drying of paddy rice is an important operation, as if this is not properly carried out the grain will be soft, and will be more or less damaged in the subsequent process of hulling, which naturally depreciates the market value of the product.

Until recently, almost the whole rice crop of British Guiana was dried in the sun, but the unfavourable weather conditions which prevailed in the 1907 season warned producers that this method was not to be relied upon at all times, and the *Demerara Argosy* states that, during the past year, a number of drying machines, have been laid down in the colony.

One of these machines to which special reference is made, is known as the 'Worrell' drier, and has been adopted on an estate at Mahaica creek. The essential part of this machine consists of a hollow steel cylinder, inclined at a certain degree. The paddy is led into this cylinder, which revolves rapidly, and keeps the grain in motion by the aid of a simple internal mechanism. Heat is supplied by a furnace beneath the cylinder, and by means of an exhaust fan a current of hot air is kept up, through which the rice passes, and by means of which it is dried as it drops from the cylinder. It is said that from 100 to 120 bags can be treated in twenty-four hours by the 'Worrell' drier.

THE MAHOGANY AND ITS SUBSTITUTES.

Mahogany timber has always been regarded as one of the most valuable and useful among the products of the tropical forest. The general mahogany of commerce is the produce of the tree *Swietenia Mahagoni*, so well known in the West Indian Islands. This tree is indigenous to the West Indies, to the mainland of Central America, and to the West Coast of Africa. It belongs to the natural order Meliaceae, which also includes several other trees, the woods of which are often used as substitutes for the produce of *Swietenia Mahagoni*. The history and characteristics of the various mahogany trees and the timbers yielded by them lately formed the subject of two articles appearing in successive numbers of the *Journal* of the Royal Society of Arts. From those articles the particulars given below have been abstracted:—

The first mention of mahogany in European books occurs shortly after the discovery of America, from which it is evident that the value of the timber early attracted attention. Sir Walter Raleigh used the wood in 1597 for repairing his ships at Trinidad. Some doubt occurs as to the date of the first introduction of mahogany into England, but, according to the best accounts, it became an article of commerce in that country about 1724. 'Spanish mahogany,' which forms the most superior kinds of these timbers, is the produce of Cuba, Hayti, and San Domingo, and these kinds have a prestige over all others on the European market. A good deal of mahogany is imported into Great Britain from British Honduras; this is frequently known as 'bay-wood' (an abbreviation of 'Honduras bay').

The precise period which a mahogany tree takes to attain full growth is not accurately known, but it is estimated that the time to arrive at maturity is probably not less than 200 years. When full-grown, the trunk is not infrequently 50 feet in height, with a diameter of 12 feet.

The bark of *Swietenia Mahagoni* possesses the properties of a febrifuge, while it is mentioned that the powdered seeds formed the basis of a cosmetic which was famous throughout tropical America for centuries.

In British Honduras, the season for wood-cutting in the mahogany forests commences about August. Felling continues till March, when the dry season has well set in, and the ground is hard. Hauling the timber to water-ways goes on through March and April, and with the arrival of the rainy season in May and June, the logs are floated down to the port of shipment. In Cuba the logs are cut throughout the year, but more particularly from October to June.

The authors of the articles in the *Journals* referred to give a list of trees, the woods of which frequently serve as substitutes for mahogany. As already mentioned, these trees all belong to the Meliaceae. They are found growing in various parts of India or in West Africa.

Cedrela Toona is an evergreen forest tree, the home of which extends to Western India, to Eastern Bengal, and far into Burmah. The wood of this tree is red, and forms a timber which is stated to be in no way inferior to that of *Swietenia Mahagoni*. English names for this timber are 'East Indian Mahogany,' 'Bastard Cedar,' etc. Its bark also possesses febrifugic properties, and its flowers are used for preparing a red dye.

Another 'mahogany,' is the tree *Swietenia febrifuga*, Roxburgh, a native of Western and Central India, in which country it attains enormous dimensions. It yields a bright-red, hard and durable wood, known in England as 'Indian Red Wood,' 'Red Cedar,' etc. This tree has a bitter bark.

Swietenia Chloroxylon, Roxburgh, is a small deciduous forest tree of Western India, with a hard, durable, yellow wood of fine grain, and an exquisite satin-like lustre, from which it takes its English name of Satin Wood.

The African mahogany is the produce of *Khaya senegalensis*. Although this tree belongs to a different genus, timber merchants in England regard the best African shipments as being essentially the same as the mahogany from Central America, especially in structure and fibre.

Swietenia Chickrasa, Roxburgh, a lofty forest tree of Western India, Eastern Bengal, and Burmah, yields a beautifully veined, close-grained heart wood, which is as lustrous as satin wood and greatly prized by cabinet makers. The bark of this tree possesses astringent properties, while its flowers are used for dyeing red and yellow.

Other 'mahogonies' are *Melia Azadirachta*, Linn., an Indian forest tree of fine proportions, and *Melia Azedarach*, Linn. The latter is found in the West Indies, where it is known as the 'Barbados lilac,' and in some places as the 'China berry.'

AGRICULTURAL CO-OPERATION MOVEMENT IN GREAT BRITAIN.

A movement has recently been set on foot in Great Britain with the object of establishing a general system of co-operation among farmers throughout England, Scotland, and Ireland. Sir Horace Plunkett, Chairman of the Joint Board for Co-operative Agricultural Trade, and formerly Vice-President of the Irish Department of Agriculture and Technical Instruction, which has done so much to develop co-operation in Ireland, has issued a memorandum setting forth the scope and purpose of this board.

The three main directions, indicated by the memorandum in which agricultural co-operation is to be advanced, are:—

1. The organization of farmers is to be brought to a higher level of business efficiency by the exchange of experiences between the three Organization Societies of England, Scotland, and Ireland respectively.

2. The co-operative agricultural trade is to be developed by joint action between the organized farmers of the three countries, and

3. Regarding the agricultural interest as a whole, the new machinery which is to be established for these two purposes will be used, as the opportunity presents itself, for advancing and protecting the interests of the agricultural classes in relation to government.

Continuing his remarks in the memorandum, Sir Horace Plunkett states that the movement will be primarily and essentially practical in its aims; and the matters in which joint action may usefully advance agricultural co-operative trade fall into three main divisions:—

1. The acquisition of farmers' supplies of the best quality at the lowest price.

2. The marketing of agricultural produce in the most economical manner.

3. The interchange of certain products between the branches.

The memorandum also deals with the development in relation to government, the value of organization being insisted upon as a means of strengthening the position and influence of the agricultural interest in its relation to local administration and government.

PROPOSED AGRICULTURAL SCHOOL FOR BRITISH GUIANA.

At a meeting of the British Guiana Court of Policy on November 2, the Hon. C. P. Gaskin, member for New Amsterdam, brought forward the following motion which was carried without a division:—

Whereas the need has arisen for the establishment of an Agricultural School in this colony on the same lines and principles as the schools established by the Imperial Department of Agriculture in several of the West Indian Islands, be it resolved that his Excellency the Governor be pleased to appoint a commission to enquire into the feasibility of establishing a similar school in this colony.

In supporting his resolution Mr. Gaskin referred to the large and increasing amounts of money that were being spent on agricultural education in different countries, and also pointed out the great value of such a training to the youth of a colony whose interests were almost entirely agricultural. Some particulars were given of the work done at the Dominica and St. Vincent Agricultural Schools, and of the cost of these institutions.

POLLINATION OF TOMATOS.

The question of the pollination of tomatos has been undergoing investigation at a number of Experiment Stations in the United States, and the results obtained are distinctly interesting. The report on the work done is summarized as follows in *Farmers' Bulletin 317* of the United States Department of Agriculture:—

As far back as 1890-1 it was found at the Cornell Station that the amount of pollen used in fertilization of the tomato flower had an important influence on the form and size of the fruit produced. More recently these results have been confirmed at the Michigan Station, where it has also been shown that no decided advantage was gained by the cross-pollination of varieties as compared with self-pollination. Four plants of each of six varieties were employed to determine the effect of using varying amounts of pollen. All the flowers on one plant of each variety were emasculated and pollinated on one side of the stigma only. These invariably produced lop-sided and small fruits. All the flowers on one plant of each variety were pollinated with from one to five pollen grains. These produced very small solid fruits, with an average weight of about 1 oz., and having no seeds, or but one or two. All the flowers on one plant of each variety were pollinated with a large amount of pollen, spread all over the stigma. These produced fruits that were smoother and heavier than those produced from flowers that received but a small amount of pollen. The conclusions deduced from these experiments are that when pollen falls on one side of the stigma only, a one-sided tomato always results, and the larger the stigma the greater the irregularity. The amount of pollen applied determines to a great extent the size and smoothness of the tomato, but after applying a certain amount no further increase can be obtained. The small, irregular tomatos grown under glass are caused largely by insufficient pollination.

With a view to throwing some light on the relative value of cross and self-pollination, the blossoms of four plants of each variety were self-pollinated, and the blossoms of eight plants of each variety were cross-pollinated with two other varieties. All set fruit equally well. The 265 fruits produced from self-pollination had an average weight of 77·3 grammes. The 534 fruits produced from cross-pollination on all six varieties had an average weight of 79·1 grammes. There was, therefore, practically no gain in the total number of cross-pollinated fruits, but a slight gain in weight. Although it does not appear necessary to raise several varieties for the purpose of cross-pollination, there is no harm in alternating such varieties as are grown, and in some cases a possible benefit, such as a slight increase in weight, may be obtained. All the experiments, however, show that the setting of a good crop of smooth, heavy fruit depends largely on the care taken in distributing the pollen.

LIVE STOCK INSURANCE.

The question of the insurance of live stock by agriculturists, a practice which has been increasingly adopted in many European countries of late years, was discussed in the *Agricultural News* of September 19 last (page 302), when full details were given as to the system of mutual insurance in vogue in Holland. Steps have been taken to introduce a similar system among live stock proprietors in South Africa.

The insurance of cattle, horses and sheep is a recognized economic principle among agriculturists in Denmark and Norway, and an article in the *Journal of the Board of Agriculture* (Great Britain) for October last, contains particulars of the system that has been adopted in those countries.

In Denmark, it appears, there are at present about 1,400 mutual live stock insurance societies, in which the losses suffered by individuals are distributed among all the members in proportion to the amounts for which they are insured. One of the oldest associations was formed in 1859, and the value of the animals (horses, cattle, sheep, goats and swine) insured in this company was £194,000. The premium for cattle is 3 per cent. The full value of the animal is paid in case of death, and compensation is also given in case of severe injury.

There is another Danish mutual association chiefly patronised by owners and large farmers, and in 1906 the amount insured in this company was £1,346,000, together with special insurances to the amount of £526,000. The expenses of administration of this company are stated to be at the rate of about 1*d.* for every £5 insured. The premiums are low, and if only one animal on a farm dies, 40 per cent. of its value is paid to the owner. If more than one animal dies 40 per cent. of the value of the first is paid, and 80 per cent. of the value of those that died later. About half of the horses, and one-sixth the total cattle in Denmark are insured.

In Norway the principle of insurance of live stock is generally accepted among farmers, and large numbers of mutual societies exist for this purpose. Some of these associations insure horses only, others both horses and cattle; some compensate for the whole loss that has been sustained, others for only part of it.

The Norwegian Department of Agriculture has prepared a set of model rules which are recommended for the guidance of mutual societies, but these receive no State aid. The Department of Agriculture considers it inadvisable to start a mutual insurance society for less than 100 horses and 200 to 300 cattle. It is recommended that the maximum sums for which horses and cattle can be insured should be £55 and £14 respectively. In order to ensure the careful treatment of insured animals, it is further recommended that compensation be not paid in full for losses, but that the insurer take a small part of the risk.

MARKET REPORTS.

London,—November 10, 1908, The West India Committee Circular; Messrs. Kearton Piper & Co., October 27, 1908. Messrs. E. A. de Pass & Co., October 30, 1908.

Arrowroot—Quiet; 1¾d. to 2d. per lb.
Balata—Sheet, 2/1 to 2/5; block, 1/7½ to 1/8.
Bees'-wax—Good quality, £7 10s. to £7 17s. 6d. per cwt.
Cacao—Trinidad, 55/- to 72/- per cwt.; Grenada, 48/- to 57/- per cwt.
Coffee—Santos, 24s. to 24s. 4½d. per cwt.; Jamaica, no quotations.
Copra—West Indian, £18 10s. per ton.
Cotton—St. Vincent, 14d. to 16d., and St. Kitt's 13d. to 14½d.; West Indian, Sea Island, good medium to medium fine, no quotations.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—Not wanted
  Pine-apples—St. Michael, 2/- to 4/6.
  Grape Fruit—10/- to 12/- per box
  Oranges—Jamaica, 7/6 to 9/6 per box.
Fustic—£3 to £4 per ton.
Ginger—Quiet.
Honey—Darkish, 22s. 6d. per cwt.
Isinglass—West India lump, 1/4 to 2/4 per lb.
Lime Juice—Raw, 10d. to 1/2 per gallon; concentrated, £15 15s. to £16 per cask of 108 gallons; distilled oil, 1/9 per lb.; hand-pressed, 4/6 to 5/- per lb.
Logwood—£3 to £4 5s. per ton; roots, no quotations.
Mace—Steady.
Nutmegs—Quiet.
Pimento—Quiet.
Rum—Jamaica, 3/4 Demerara, 1s. 3d. to 1s. 6½d. proof. Trinidad, no quotations.
Sugar—Crystals, 15/6 to 16/9 per cwt.; Muscovado, 14/3; Syrup, no quotations; Molasses, no quotations.

New York,—November 13, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12½c. to 13c.; Grenada, 11½c. to 12¾c.; Trinidad, 12½c. to 13c.; Jamaica, 9¾c. to 10½c. per lb.
Cocoa-nuts—Jamaica, select, $25·00; culls, $15·00; Trinidad, $25·00; culls, $14·00 per M.
Coffee—Jamaica, ordinary, 7c. to 7½c.; good ordinary, 8c. to 8½c.; washed, 9c. to 11½c. per lb.
Ginger—10c. to 13¾c. per lb.
Goat Skins—Jamaica, 53c.; Antigua and Barbados, from 49c. to 51c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 48c. per lb., dry flint.
Grape Fruit—Jamaica, $2·50 to $4·50 per barrel.
Limes—No quotations. Market over-stocked.
Mace—29c. to 31c. per lb.
Nutmegs—110's, 9½c. per lb.
Oranges—Jamaica; $4·00 to $5·00 per barrel; $1·75 to $2·25 per box.
Pimento—4c. per lb.
Sugar—Centrifugals, 96°, 3·94c.; Muscovados, 89°, 3·44c.; Molasses, 89°, 3·19c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., November 16, 1908; Messrs. Leacock & Co., November 21, 1908; Messrs. T. S. Garraway & Co., November 23, 1908.

Arrowroot—St. Vincent, $4·00 to $4·50 per 100 lb.
Cacao—Dominica and St. Lucia, $12·00 to $13·00 per 100 lb.
Cocoa-nuts—$13·00 for unhusked nuts.
Coffee—Jamaica and ordinary Rio, $9·00 to $10·50 per 100 lb.
Hay—$1·20 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $42·00 to $48·00; Sulphate of ammonia, $72·00 to $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, $2·50 to $2·75; loose, $2·00 per 100 lb.
Potatos—Nova Scotia, $1·80 to $2·00 per 160 lb.
Peas—Split, $6·40 per bag of 210 lb.; Canada, $3·50 per bag of 120 lb.
Rice—Ballam, $5·75 (180 lb.); Patna, $3·50, Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, November 14, 1908; Messrs. Sandbach, Parker & Co., November 14, 1908.

Arrowroot—St. Vincent, $9·00 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 48c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—60c. to 8oc.
Cassava Starch—$5·00 to $6·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb., slow.
Dhal—$4·80 per bag of 168 lb.
Eddos—$1·00 per barrel.
Molasses—No quotations
Onions—Madeira, 2¼c. to 2½c.; per lb.
Plantains—10c. to 24c. per bunch.
Potatos—Nova Scotia, $2·25 per 100 lb.
Potatos—Sweet, Barbados, $1·20 per bag.
Rice—Ballam, $6·00 to $6·25; Creole, $4·60 to $4·75; Seeta, $6·00.
Split Peas—$7·00 per bag (210 lb.); Lisbon, no quotations.
Tannias—$1·44 per bag.
Yams—White, $2·16; Buck, $3·24 per bag.
Sugar—Dark crystals, $2·15 to $2·25; Yellow, $2·80 to $3·20; White, $3·50 to $3·70; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—November 14, 1908.—Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·25 to $12·50 per fanega; Trinidad, $12·25 to $12·75.
Cocoa-nuts—no quotations.
Cocoa-nut Oil—66c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¾c. per lb.
Copra—$3·00 to $3·10 per 100 lb.
Dhal—$4·50 to $4·60 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·25 to $1·50 per 100 lb.
Rice—Yellow, $5·40 to $5·75; White, $4·50 to $4·80 per bag.
Split Peas—$6·25 to $6·50 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

A FORTNIGHTLY REVIEW
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Superphosphate and Basic Slag.

AMONG the phosphatic manures at the disposal of the planter, by means of which he may return to the soil the phosphoric acid that is withdrawn in more or less quantity in the production of various agricultural crops, the chief are superphosphate and basic slag. Other manures that form sources of the necessary phosphates are dissolved bones, bone meal, and the various guanos.

Both superphosphate and basic slag consist of phosphoric acid in combination with lime (calcium oxide). It is well known, however, that the two constituents are combined in very different proportions in the two manures, and that as a result they possess somewhat different properties.

Superphosphate is prepared from insoluble mineral phosphates by treatment with sulphuric acid. As a result the tribasic calcium phosphate (three proportions of lime to one of phosphoric acid) is converted into soluble monobasic calcium phosphate (one proportion of lime to one of phosphoric acid). Commercial superphosphate is thus a mixture of the soluble calcium phosphate with phosphoric acid, together with gypsum (calcium sulphate), and various impurities derived from the original mineral. It will be seen that the manure necessarily contains an excess of phosphoric acid. Ordinary superphosphate will contain about 26 per cent. of water-soluble phosphates, together with 2-3 per cent. of undissolved phosphate.

Basic slag is a by-product obtained in the conversion of iron into steel, and the phosphoric acid of this manure originally existed in combination with iron in the ore. Basic slag varies considerably in quality, but the phosphoric acid present is usually equal to from 35 to 40 per cent. of tribasic calcium phosphate. The phosphoric acid does not exist in this latter form, however, being combined with a larger proportion of lime in the form of tetracalcic phosphate, i.e., a phosphate containing four proportions of lime to one proportion of phosphoric acid. This tetracalcic phosphate is more soluble than the tricalcic phosphate, and consequently is more active.

In deciding which manure to use when an application of phosphates is necessary the planter is naturally guided by the nature of the soil, and the kind of crop that is to be grown. The phosphates are present in larger proportion, and in a more readily available form in superphosphate than in basic slag, and, speaking generally, it may be assumed that the former is likely to prove more suitable on the majority of cultivated lands, and more especially where rapid effect is wanted. It is naturally to be preferred on calcareous or chalky soils, such as those of Barbados. As a source of phosphatic food for plants, it may be said that no manure is more reliable and certain in its results than superphosphate. This manure, however, should not be mixed with nitrate of soda previous to application, since not only does such a mixture result in the loss of more or less nitrogen, but the mass is apt to become sticky, and difficult to distribute.

A good superphosphate should be a fairly dry, friable powder, and should not readily become wet and sticky. This tendency to stickiness is more common in the high grades of the manure than with lower grades, and arises from the fact that an excess of sulphuric acid has been used in the manufacture, in order to dissolve as much of the phosphate as possible.

It is frequently stated that acid superphosphates have a tendency to make land sour, particularly heavy land. The best way to counteract this is by giving an occasional dressing of lime. It has been calculated that 1 cwt. of lime per acre is more than sufficient to correct the acidity of any reasonable dressing of superphosphate, so that if an average dressing of lime is given at periodic intervals, no fears need be entertained as to the souring effect of applications of superphosphate. It may further be mentioned that on many soils, particularly clays and sands, occasional applications of lime have an excellent effect in increasing the result of subsequent dressings of superphosphate.

Basic slag is especially suitable for use on heavy clays, and on peaty and acid soils, as well as on land containing much organic matter, probably because on such soils the large proportion of lime this manure contains exercises a greater effect than on others. It is generally preferable to superphosphate in manuring grass land and fruit trees. It may be pointed out, too, that it has also been used, with very remunerative results, in combination with nitrogen and potash, and also with potash alone, for manuring cacao at Dominica.

It is generally assumed that 5 cwt. of slag are equivalent in effect to 3 cwt. of superphosphate, but a good deal depends on the fineness of grinding of the slag, which is a very important factor. The manure should be ground so finely that from 70 to 90 per cent. will pass through a sieve having 10,000 meshes to the square inch, and, in many cases, even finer grinding than this can be obtained.

It is probably generally understood that basic slag should never be mixed with sulphate of ammonia, since the excess of lime causes free ammonia to be given off, and there is consequently a considerable waste of nitrogen.

SUGAR INDUSTRY.

Queensland's Sugar Industry.

The *American Sugar Industry* of October last contained the following note on sugar production in Queensland and other Australian colonies: —

> Queensland has a bright future ahead for its sugar industry, as the crop of last year (1907-8), carried through almost entirely on white labour, was a record one. The Government statistician says that the output was a record for the State, due to the very high saccharine contents of the cane cut, especially at Ingham Mourilyan, Ayr, and Mackay. The area cultivated was 126,810 acres, of which 94,384 acres were crushed. The yield of cane was 1,665,028 tons, and of sugar 188,307 tons. The acreage under cane was 6,474 acres less than in 1906.
>
> It is interesting to note, in view of these figures, that the sugar consumption of the commonwealth of Australia is put down at 191,416 tons, and of New Zealand 42,673 tons. In addition to Queensland, New South Wales last year produced 72,873 tons, Victoria 53,437 tons, South Australia 17,486 tons, Western Australia 12,754 tons, and Tasmania 7,323 tons.

Sugar-cane Experiments in British Guiana.

A report on the cultivation of varieties of sugar-cane in British Guiana during the two crop seasons of the year ended December 31,. 1907, has lately been issued by the Director of Science and Agriculture of the colony, on behalf of the Sugar-cane Experiments Committee of the Board of Agriculture. Thirty-one of the plantations which carried on trials on a large scale with varieties of cane placed their results at the disposal of the Board of Agriculture. In the following table these results are set out, showing the acreage occupied with certain varieties of canes during 1907-8, and the mean yield of sugar given per acre, taking all the experiments, both with plant canes and ratoons, into consideration:—

Variety.	Acreage occupied.	Mean return of sugar per acre in tons.
D. 130	19	2·30
B. 109	137	1·83
Green Transparent	137	1·83
D. 625	4,508	1·72
B. 208	2,786	1·72
D. 145	1,662	1·72
D. 116	116	1·67
D. 115	19	1·61
D. 117	45	1·59
Sealy Seedling	126	1·58
D. 109	7,434	1·56
Bourbon	15,279	1·53
White Transparent	898	1·40
B. 147	1,103	1·40
D. 74	123	1·33
D. 95	123	1·17

It will be seen that the greatest diversity existed as regards the areas planted with the different varieties of sugar-cane. Further, while only four experiments are recorded with some canes (as D. 74 and D. 130, for example), other varieties were under trial in from thirty to over fifty experiments during the year.

The figures given under the heading 'mean return of sugar per acre' are not simple averages obtained as the result of dividing the actual total yield of sugar given by a particular variety of cane by the acreage planted with this cane, but are arrived at in the following manner: In the case of a given variety, the average yields of sugar per acre, in every experiment, both with plants and ratoons, carried out with that cane, are taken, and the average of all these averages represents the 'mean return per acre.' Professor Harrison expresses the opinion that these mean returns are more reliable guides to the relative general value of the varieties than are the simple averages.

A second table given in the report shows the number of plantations on which the different varieties were cultivated during the year, and also indicates the number of cases in which a given cane gave the highest or second highest yield of sugar per acre on the plantation.

D. 109 was planted on twenty-six estates, giving the highest yield in three cases, and the second highest yield on three other estates. The Bourbon, cultivated on twenty-five estates, gave the best return in only two cases, while it came second in four instances. D. 625 did best of all; it was cultivated on twenty-four estates, coming out first in ten instances, and giving the second highest return in ten other cases. D. 145 was grown on seventeen plantations, giving the best yield on the estates in three cases, and coming second in four instances. B. 208 and B. 147 were cultivated on twelve and on fifteen estates respectively. Both canes were first, as regards return of sugar given, on three estates, and in one instance each they came second.

The experiments indicate that many varieties of sugar-cane can be relied upon in British Guiana to give yields of sugar in quantities equal to, or greater than, those obtained from the Bourbon, and that several varieties possess well-marked ratooning qualities. D. 625 and D. 145 can be safely recommended for trials on relatively heavy lands, while B. 208 does well on lighter soils, and appears to be specially suited for that class of land.

Certain varieties, as D. 95, D. 74, D. 78, and the White Transparent,—show signs of falling off in their yields, and the Committee feel that their cultivation should not be continued except on land which has proved very suitable to their growth. D. 109 showed signs of falling off in its yield on several plantations, especially where grown as second or third ratoons, although on other estates it gave very satisfactory yields as plant canes.

A later table in the report gives particulars of the amounts of sucrose contained in the juice of the different varieties of cane under cultivation. These figures are averages for the past four years, and the sucrose is expressed in pounds per gallon. They are as follows: B 208, 1·598 lb.; D. 95, 1·592 lb.; D. 74, 1·567 lb.; D. 116, 1·493 lb.; D. 145, 1·475 lb.; White Transparent, 1·452 lb; Bourbon, 1·444 lb.; D. 78, 1·443 lb.; Sealy Seedling, 1·442 lb.; D. 109, 1·421 lb.; D. 625, 1·414 lb.; and B. 147, 1·413 lb.

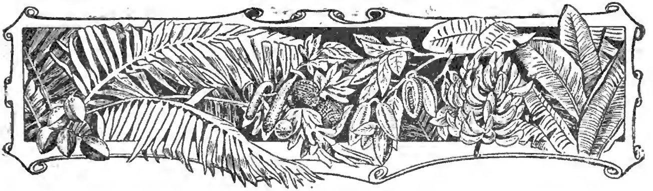
AGRICULTURAL SCIENCE EXHIBITIONS AT HARRISON COLLEGE, BARBADOS.

In the course of the speech made by the Principal of Harrison College, Barbados (the Rev. H. A. Dalton, D.D.), at the recent annual distribution of prizes on December 2 last, reference was made to the Agricultural Science Exhibitions, which until recently, have been awarded by the Imperial Department of Agriculture, and were tenable by pupils at the school.

Dr. Dalton pointed out that the Agricultural Science class at Harrison College afforded the most valuable elementary scientific training to boys entering the school in those branches of Agriculture which were most important to Barbados and the West Indies generally. In past years the work of the class had been of great benefit to Barbados and certain of the neighbouring colonies, but he was sorry to state that, in consequence of the diminution of the funds at the disposal of the Imperial Department of Agriculture, the Department could no longer continue the Agricultural Science Exhibitions.

The suspension of this assistance was a great loss to the educational facilities of the island, and he (Dr. Dalton) sincerely hoped that before long the matter would receive the attention of the Legislatures of this and other colonies, and that grants would be made for the revival of the Agricultural Exhibitions.

Electricity and the Growth of Crops. The results of certain electrical experiments on the growth of agricultural crops were referred to at the late meeting of the British Association by Sir Oliver Lodge, Principal of Birmingham University. These experiments have been in progress for three years with a number of crops, and in the case of wheat, for instance, it was found that the electrical treatment resulted in an increased yield of from 30 to 40 per cent. more grain than would otherwise have been obtained. Strawberries and fruit trees also yielded increased crops. Sir Oliver Lodge stated that no dogmatic explanation could yet be given as to the manner in which the electrification benefited the plant, but the results were beyond doubt.



WEST INDIAN FRUIT.

FRUIT AT ST. LUCIA.

Considerable attention is being paid by the Agricultural Department at St. Lucia to the propagation of good varieties of different kinds of fruit. Among these, limes take a leading place.

Evidence of the interest taken in lime planting is given by the fact that a total of 56,425 plants were distributed from the Botanic Station of the island in 1907-8. This is an increase of 19,309 as compared with the number sent out in the previous year. It is mentioned, too, in the *Annual Report* on the Station, that large numbers of plants have also been raised in private nurseries.

A lime plot, established in 1905 on the land worked in connexion with the Agricultural School, St. Lucia, is making good progress. The orange snow scale (*Chionaspis citri*) appeared on several of the trees, but spraying with kerosene and whale-oil soap solution proved an efficacious method of destroying this pest.

In 1907, shipments of green limes were made to London and New York. Those sent to England, it is stated, realized a price of as much as 3*s*. 9*d*. per box of 200 fruits, while the shipment to New York was sold at prices rising to 14*s*. 2*d*. per barrel of 1,200.

The Fond Deveaux estate possesses the pioneer lime plantation of St. Lucia, and from this, the first export of concentrated lime juice manufactured in the island was shipped during the year. A lime factory constructed on modern lines has lately been erected on this estate. The juice is extracted by means of granite rollers, and concentrated in wooden vats.

The orange trees at the St. Lucia Experiment Station are coming on well, and most of them bore some fruit in the season 1907-8.

A tree of an early variety, 'Parson Brown' bore a crop of nearly 200 oranges at four years from planting. Varieties that have been established at the Station for some time are Parson Brown, Whittaker, Jaffa, Washington Navel, Tardiff, and Union. In addition four other varieties—Ruby, Pineapple, Majorca, and Homasassa—have lately been contributed from the Botanical Department, Trinidad.

Plants of several varieties of choice grafted mangos have lately been introduced and planted out in the grounds. These include the 'Peters,' 'Peach,' and 'Gordon' varieties, presented by the Trinidad Botanical Department, and which are new to St. Lucia. Mango plants of the varieties 'D'Or,' 'Reine Amelie,' 'Divine,' and 'Julie' have been obtained from the Agricultural Department at Martinique.

ORANGE TRADE IN SPAIN.

Some notes on the depressed condition of the orange-growing industry in Spain were given in the *Agricultural News* of November 14 last (page 356). In further reference to this subject it may be mentioned that the latest report of the British Consul at Barcelona discloses no improvement in the situation, but rather a more unsatisfactory condition than that previously described.

Valencia is the chief Spanish port from which oranges are shipped to Great Britain, and while in 1905 the exports to British markets reached 1,594,274 cases, they fell to 715,399 cases in 1907. The freight per case of oranges from Valencia to England or Germany averages from 1*s*. to 1*s*. 3*d*.

The Consul states that the 1907-8 season, from its commencement at the beginning of November 1907, up to the end of the same year, was altogether disastrous. The output in the Spanish orange-growing provinces has continued steadily to increase for years past, and, as previously mentioned, this overproduction has had to compete with large crops of fruit grown in other parts of the world.

It is not expected that the crop will continue to increase in future seasons. Growers have realized that it is useless to plant more trees under present conditions, and with the unremunerative returns which are now alone obtainable, they cannot afford the generous applications of artificial manures which have been regularly given in past years.

The British Vice-Consul at Valencia in his report for the year 1907, also refers to the bad season which orange growers have suffered in his particular district. At the commencement of the season in November 1907, shipments began on an enormous scale, and as the fruit was mostly too unripe, disastrous prices resulted, and severe losses were experienced.

As mentioned in the previous article on this subject, Spanish oranges pass through many intermediaries before being placed on the British or other markets. Meetings of growers and shippers have of late been frequently held to discuss the unsatisfactory condition, and to endeavour to suggest a remedy. In general, the concensus of opinion points to the necessity of developing a system of co-operation, and to the formation of syndicates of growers which would undertake the packing, shipping, and sale of the fruit in foreign markets. There is a desire to try the experiment of selling direct to the consumer, and thus avoid the increased expenses caused as the result of the fruit being handled by so many agents.

CACAO EXPERIMENT PLOTS AT ST. LUCIA.

Cacao forms one of the chief crops under experiment on the land worked in connexion with the St. Lucia Agricultural School and, as in the experiments carried on at Dominica, great advantage has resulted to the cacao trees from mulching the soil with grass, leaves, etc. In the 1906-7 season, it is mentioned that two applications of grass were made, one in October and a second in January. Altogether, about 18 tons of grass were applied to a plot 1 acre in extent. As a result, there was a very noticeable improvement in the vigour of the trees, which passed through the dry season in much better condition than in previous years, dropping their leaves more gradually, and remaining practically free from fungoid and insect troubles.

In further reference to work with cacao at the Agricultural School, the latest *Annual Report*—that for 1907-8—contains the following:—

The improvement shown by the cacao on one plot as the result of mulching, reported upon last year, has been maintained. During the year, the plot was cutlassed in May, and mulched with grass in July, cutlassed again and mulched in October, but owing to a heavy flood on October 19, which washed off all the mulch and fine surface mould, the plot had to be re-mulched again, as it was necessary to provide immediate protection to the surface roots of the trees which had been exposed. A third cutlassing was given in February.

The trees are six and a half years old, and from the time they commenced to bear in 1906 up to the end of July 1908, have yielded in dry cacao and its equivalent as seed, a total of 306 lb., of which 259½ lb. were obtained during the period from April 1907 to June 1908. The total yield to date would have been much greater had the development of the trees been more uniform. In a portion of the plot the soil is very heavy, and as the result the development of the trees in this part has been retarded.

A second plot, 1⅓ acres in extent, was weeded in May, August, October, and February; the drains were cleaned, and the more backward trees manured with bone meal and dry blood. The trees were pruned, and fruits removed from several of them which were fruiting at two and a half years from the date of planting.

There are welcome indications of a growing interest in the practice of mulching as a means of maintaining and increasing the fertility, and improving the physical condition of the soil in cacao orchards. The mulched plot at this station has been visited by several local planters, and information respecting the methods adopted has been sought and given. Mulching is now being tried on several large cacao properties, and the practice is likely to be extended, with beneficial results.

Plants have been prepared in bamboo pots for use as stocks on which to work grafts from some of the best cacao trees at the station, and several grafted plants which have already been raised will be planted out in one of the new plots. We have a tree of the Alligator cacao (*Theobroma pentagona*) from which grafts will be worked on Forastero and Calabacillo stocks.

Four plants of *Theobroma angustifolia* were received from the Superintendent of the Trinidad Botanical Department. Three of them have grown well and will be tried as stocks for grafting purposes.

PIPE CALABASH AT ST. LUCIA.

Several references to the cultivation of the African Pipe Calabash (*Lagenaria vulgaris*) have been made in past numbers of the *Agricultural News* (see Vol. VII, pp. 123 and 269). Seeds of this plant were some time ago obtained from South Africa by the Imperial Commissioner of Agriculture and distributed to Botanic Stations in the West Indies. The Curator of the St. Lucia Botanic Station makes the following reference in regard to the seeds received by him:—

Two seeds of the African Calabash Pipe Gourd (*Lagenaria vulgaris*), received from the Imperial Commissioner of Agriculture, were sown on arrival, and one plant was set out near an old compost heap, where it grew well. Of the fruits that formed, forty came to maturity. The vines commenced flowering in December, and the fruits ripened in the following April as the vine was drying up. All the fruits that rested on the ground acquired crooked necks, while those suspended from supports remained straight, as would be expected. A plentiful supply of seeds was obtained, and they have been widely distributed in the island, and to other Botanic Stations.

LEGUMINOUS PLANTS AND SOIL IMPROVEMENT.

The attention of planters at Grenada is drawn to the value of leguminous plants as agents for soil improvement in cacao and other plantations, in an article 'Agriculture and the Nitrogen Problem,' that appears in the *Grenada Bulletin of Miscellaneous Information* for October last:—

The article is written by the Agricultural Superintendent of the island, and in the course of it, Mr. Anstead refers to the large number of leguminous plants, many of them being wild, which exist in Grenada. In addition to the well-known examples, such as the different varieties of peas and beans, other members of the Leguminosae which occur frequently in these islands are Crotolaria, Phaseoleus, Indigo, ground nuts, and the 'sensitive plant' (*Mimosa pudica*), while among the trees are the Immortel, Flamboyant, Cassia, Saman, and Logwood. All these plants and trees are a means of enriching the soil in which they grow, by the stores of nitrogen assimilated from the atmosphere by the bacteria associated with their rootlets.

It is pointed out that if, instead of allowing ordinary weeds to grow in cacao plantations, the soil were sown with some leguminous crop, and this crop when full-grown turned into the soil, and a fresh supply of seed sown, a dressing of nitrogen in a readily available form, and at little expense, would every time be given to the cacao crop.

The best species of plant to grow for this purpose has yet to be decided by experiment. Woolly pyrol, pigeon peas, and different varieties of cowpeas are all easily grown, but some of the wild plants, such as Crotolaria are worth a trial, while the horse or sword bean (*Canavalia ensiformis*) (also known in Grenada as the 'Over-look bean') gives a heavy top growth and plenty of green material to supply humus.

In the case of old cacao trees which have become thickly covered-in, it is of course difficult to get any crop to grow in the dense shade so formed. With cacao in younger stages, however, it is at least worth while to make a preliminary trial in this direction, and it should be remembered that wherever weeds flourish, a leguminous crop of some kind would also grow.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme and Holland, of Liverpool, write as follows, under date of November 23, with reference to the sales of West Indian Sea Island cotton:—

Rather more business has been done in West Indian Sea Islands since our last report, and prices are rather in buyers favour. The sales, about 350 bales, include 90 Antigua at 13*d.* to 13½*d.*, 130 Barbados, chiefly at 13½*d.* to 14*d.*, and 100 St. Vincent at 14*d.* to 15½*d.*

The market for American Sea Islands remains steady, but there is a large quantity of old crop cotton still in Charleston unsold, and this has a depressing effect on the market for West Indian.

ADDRESS ON COTTON GROWING AT ANTIGUA.

At a meeting of the Antigua Agricultural and Commercial Society, the Hon. E. St.John Branch, Colonial Secretary of the Leeward Islands, gave an address on the subject of the late Lancashire Cotton Conference.

In giving an account of the chief points discussed at the Conference, the speaker necessarily brought forward a considerable amount of information that has already appeared in the *Agricultural News* (see *A.N.* of October 3 last, p. 310, and October 17 last, page 321), and therefore in the following summary only those points new to readers are touched upon:—

Mr. Branch pointed out that one result of the Conference had been to bring about a very satisfactory relationship between West Indian growers and Lancashire spinners. Both parties had come to recognize that their interests were largely identical, and it was clear that the Lancashire spinners were willing to go somewhat outside of the narrow laws of supply and demand to help West Indian planters to develop a successful cotton-growing industry.

Figures were brought forward at the Conference showing the quantities and values of the different grades of Sea Island cotton produced in America and the West Indies. The average Sea Island cotton crop of the world amounts to some 95,000 bales per annum. Of this, from 10,000 to 12,000 bales are grown in the Sea Islands themselves. Above 4,000 bales of the Islands crop are of the very best quality, and command the highest prices This cotton is known as 'planters crop lots,' and, on the figures of last season, was worth from 1*s.* 4*d.* to 1*s.* 8*d.* per ℔. The remaining 8,000 bales are known as 'Graded Islands', and on last year's market commanded prices of from 1*s.* 2½*d.* to 1*s.* 3*d.* per ℔. The greater part of the West Indian cotton crop, which in 1907-8 amounted to some 7,500 bales, compares more nearly with the 'Graded Islands', than to any other quality grown in America. About 1,500 bales of the West Indian produce, however, are equal to the Islands' 'crop lots.' This finer cotton comes chiefly from St. Vincent.

The soil and climatic conditions largely determined the quality of cotton produced in the different West Indian Islands. The type grown at Antigua was naturally similar to the 'Graded Islands,' and it was in the interest of planters to continue to grow this type for which, in normal years, a good demand exists that is not likely to be overtaken by the supply. The Florida grade of cotton is slightly coarser than 'Graded Islands,' and for this also there is a good demand. Last year the value of Florida cotton of the best quality, was about 1*s.* 2*d.* per ℔. Some 1,000 bales of the West Indian cotton are very similar to the Florida product. If, in deciding on the grade of cotton to be grown, they had to choose between sacrificing length or sacrificing strength, they should certainly give up length.

Dealing with the prospects of the industry in the future, Mr. Branch pointed out that cotton growing should pay sufficiently well in the West Indies if a yield of 200 ℔. of lint per acre, equal in quality to 'Graded Islands,' or even to Florida cotton, could be obtained. To secure this yield, careful seed selection was imperative, and the most approved methods of cultivation must also be followed.

Taking the matter as a whole, it must be admitted that cotton growing in Antigua is, as an industry, only in the experimental stage; and while it would be perhaps unwise for a man to put his all into the business at the present time, yet there can be no doubt of the possibility of a reasonable profit accruing to the industrious grower.

COTTON IN THE SEA ISLANDS.

In their report, dated November 14 last, on market conditions for cotton from the Sea Islands, Messrs. Henry W. Frost & Co., of Charleston, write:—

There was an active demand throughout the week for cotton from the Islands, and all the offerings of odd bags of 'fully fine' quality were taken at 25c., and of 'fine' quality at 22½c. There is also a good demand for the odd bags of lint of 'extra fine' staple, at 27c. per ℔. There is no accumulation of stock, and the daily receipts are no more than sufficient to meet the demand.

On November 21, Messrs. Frost write:—

The good demand referred to in our last report has been continued through the week, at the same prices. The receipts show a falling off, compared with the corresponding week of last year.

AGRICULTURE IN NYASSALAND.

Agriculture is undergoing steady development in Nyassaland or British Central Africa, and the agricultural products are annually increasing in value. These products consist chiefly of coffee, cotton, tobacco, Strophanthus (a plant from which the drug strophanthine is prepared), rubber, ground nuts, chillies, and bees'-wax.

The most notable feature in the agricultural returns relating to the year 1907-8 is the remarkable increase in the production of coffee. The exports in 1906-7 were 454,111 ℔., valued at £9,461. In 1907-8 they had increased to 780,133 ℔., valued at £16,253. Climatic conditions were very favourable to the crop during the year and prices have shown improvement. The area under cultivation with coffee is about 6,200 acres.

Cotton is grown over considerable areas in Nyassaland, both under European management and also on plots of land belonging to the natives. The total area under cultivation by Europeans in 1907-8 was 8,659 acres. On the land at higher levels, American Upland cotton is grown, while at lower levels the Egyptian variety is the kind cultivated. The year was not favourable to cotton growing, owing to drought in some cases, and excessive rain in others. The exports of cotton from the afore-mentioned area were 403,486 ℔., valued at £13,999. The shipments were less than in the two previous years, but this is explained by the unfavourable climatic conditions.

Insect pests are not so much in evidence with the cotton crop as bacterial blight or 'Angular Leaf Spot,' which especially attacks the Egyptian cotton grown on the lower levels of the country. The return of lint obtained per acre at present is decidedly low, averaging about 125 ℔. with the American variety grown on the higher levels, and no more than 70 ℔. per acre with the Egyptian variety. Considerable attention, however, is being given to increasing the yield and raising the quality of the product by careful seed selection, manuring, and good cultivation.

The cotton-growing industry of the Protectorate, it is said, is now undoubtedly established on a sound basis and the prospects of the cultivation are good. The natives are giving increased attention to the growing of cotton and 17 tons of seed were distributed free for the planting of the present season.

Tea is another promising industry in the Nyassaland Protectorate, where it can be produced very cheaply. Over 500 acres are under this crop, and the area is being increased yearly. The yield for the present season is estimated at about 9½ tons. In tea planting a period of from five to six years has to elapse before any return is obtained on the capital expended. The Nyassaland product is reported to have improved very much in quality during the last two or three years.

A large and increasing area (at least 2,400 acres at present) is being brought under rubber cultivation, the chief variety planted being the Ceara (*Manihot Glaziovii*). Several plantations exist from three to four years old, and tapping usually commences in the fifth year. During 1907-8, 1,119 ℔. of plantation rubber were exported, as against 972 ℔. shipped in 1906-7, and 523 ℔ in 1905-6. Wild rubber was exported in 1907-8 to the extent of 15,533 ℔., valued at £3,301.

A good deal of attention is also being given to a number of fibres, i.e., ramie (*Boehmeria nivea*), sisal hemp (*Agave rigida*, var. *sisalana*), and Mauritius hemp (*Furcraea gigantea*). The experimental cultivation so far made with sisal hemp has yielded very promising results, and Mauritius hemp also seems a suitable crop for many planters. In German East Africa, where the cost of labour is much greater than in Nyassaland, sisal hemp culture is said to yield a profit of at least 40 per cent., and therefore with the establishment of suitable machinery for treating the leaves of sisal and Mauritius hemp, it would seem that an important and profitable industry can be established in Nyassaland. The cultivation of ramie has not given such good results.

Ginger is another crop which it is thought will prove profitable in the Protectorate, and plants are being extensively propagated for distribution. The first supply of ginger plants was received from Kew in 1901, and propagation has been effected so far as possible from these every year since. About 1,000 plants will be sent out in the coming season.

PHOSPHATES IN THE SOIL

An exhaustive account of some of the changes that phosphates in the soil undergo as the result of the action of water and aqueous solutions upon them is given in *Bulletin 41* of the Bureau of Soils, United States Department of Agriculture.

As the result of a consideration of all the work done on the subject, the following are among the chief conclusions arrived at:—

(1) Phosphates in the soil are decomposed or hydrolysed by water, with the formation of other phosphates, containing relatively more of the base (calcium, aluminium, magnesium, etc.) in combination with the phosphoric acid.

(2) Neutral salts (i.e., those which are neither acid nor alkaline) in solution usually increase the amounts both of lime and of phosphoric acid passing into solution from a calcium phosphate, as compared with the amounts dissolved by the action of water alone.

(3) Solutions of lime salts and all alkaline solutions tend to decrease the quantity of lime and phosphoric acid dissolved from a calcium phosphate, while acid solutions increase the amounts dissolved.

(4) Phosphates of iron and alumina in the soil are acted on but slightly by solutions of salts which are neutral in reaction. Salts which hydrolyse, however, giving solutions either acid or alkaline in reaction (e.g., as magnesium sulphate or sodium phosphate respectively), increase the amount of phosphoric acid yielded to the solution from phosphates of iron and alumina.

(5) Since all soils contain far more basic matter than is sufficient to combine with the phosphoric acid present, the salts ultimately formed in practically all cases will naturally be basic in character (i.e., containing an excess of base), which are the least soluble. The concentration of the soil moisture, as regards the amount of phosphoric acid in solution, is controlled by these basic phosphates.

(6) The concentration of the phosphoric acid solution formed with the soil moisture will not be materially affected by the addition of phosphatic fertilizers to the soil, and will vary but little for different soils, and with the total amounts of phosphoric acid in soils.

The changes in both solution and solid which take place during the progress of leaching superphosphates are also described.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

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NOTES AND COMMENTS.

Contents of Present Issue.

The properties of superphosphate and basic slag, and their relative suitabilities for different soils, are discussed in the editorial.

Facts and figures, showing the chief results of experiments carried out on estates in British Guiana, during the crop seasons of 1907, with seedling and other canes are given on pages 386-7.

Notes on fruit cultivation at St Lucia, and the orange industry of Spain will be found on page 388.

Interesting and instructive experiments with cacao are in progress on the plots worked in connexion with the St. Lucia Agricultural School (page 389).

Cotton Notes (page 390) include a summary of the chief points of an address on the Lancashire Cotton Conference recently delivered at Antigua by one of the delegates. A summarized account of agricultural conditions in British Central Africa is given on the following page.

Remarkably successful results have attended the maize breeding work that has been carried on at the Illinois Experiment Station since 1896 (page 394).

On page 398 will be found an account of the method employed in the manufacture of calcium cyanamide, together with other particulars in regard to this new nitrogenous manure.

Broom Corn At Dominica.

A plot of broom corn about ¼-acre in extent was grown at the Botanic Station in 1907. The seed was sown in July on banks 4 feet wide, and at distances of about 2 feet in the row. The corn grew well, and brush commenced to form six weeks after sowing. As the brush emerged from its sheath, the heads were bent over at about 3 feet from the top, since this assists in the production of a straight compact brush. The brushes were cut at distances of about 1 foot from the ground, and afterward placed on shelves in a shed to dry. The process of drying occupied about two weeks. Cleaning followed, an ordinary curry comb being used for drawing away the seed. Owing to unfavourable weather the yield was small—no more than at the rate of 224 lb. per acre.

* * *

Crown Lands at Trinidad.

The sales of Crown lands at Trinidad during 1907-8 are reported upon as being highly satifactory, especially upon comparison with the figures of the previous year. The increased demand for land is explained by the high prices received for last year's cacao crop, and the improvement of means for travelling and transport as the result of opening up new roads in the island.

Altogether, 1,157 grants of Crown lands were made, comprising 9,494¼ acres, for which £24,768 18*s.* 3½*d.* were received. Of this area, 475 grants, comprising 3,186¼ acres, were made to East Indian immigrants. In 1906-7, the total area granted was 8,004¼ acres.

In Naparima, 1,772 acres of Crown lands were taken up in the past year, this being the highest total acreage granted of any Ward Union. Savana Grande comes next with 1,364 acres, and Chaguanas third, with grants amounting to 1,136 acres.

* * *

Botanical Expedition to Jamaica.

Dr. N. L. Britton, Director of the New York Botanic Gardens, has just issued a report on his recently completed fourth trip of botanical exploration to the island of Jamaica. A collection of West Indian plants, seeds, fruits, and herbarium specimens, numbering altogether about 3,500, was made. These of course include many duplicates.

Among the interesting plants collected were a number of epiphytic bromelaids, belonging to the genus Hohenbergia. About fifteen species of this genus exist in Jamaica, but Dr. Britton states that at least six are new to science.

A specimen of the larged-leaved little-known Plumier's grape-tree (*Coccoloba Plumieri*) was found in the ripe fruiting stage at Mandeville. Another interesting plant found at Cedar Hurst, at a high elevation, was the climbing aroid *Philodendron tripartitum*, a native of Venezuela. Many orchids were also obtained in this neighbourhood, which is rich in rare mosses and ferns. A species of Dorstenia, hitherto unknown in the Jamaica flora, was also discovered in the limestone cliffs at Somerset.

Trinidad Agricultural Department.

Subject to the approval of the Secretary of State for the Colonies, his Excellency the Acting Governor of Trinidad has appointed Professor P. Carmody, F.I.C., F.C.S., to be Director of the newly organized Department of Agriculture for the colony. This appointment (which Professor Carmody will hold in addition to his office as Government Analyst and Professor of Chemistry) will date from November 1 last.

The following previously separate Departments have been amalgamated to constitute the new Department of Agriculture: (1) the Government Laboratory; (2) the Botanic Gardens (including the Experiment Station, Trinidad; River estate, Trinidad; and the Botanic Station, Tobago); (3) the Government Stock Farms at Trinidad and Tobago, and (4) St. Augustine estate.

World's Output of Tobacco.

The statistical returns of the United States Department of Agriculture place the world's tobacco crop for 1906 at 2,201,191,000 lb. Of this amount 690,429,000 lb., or 31·4 per cent. of the whole, were produced in the United States itself. British India comes second on the list of tobacco-producing countries, the output in 1906 being 450,000,000 lb. In past years Russia has produced more tobacco than any other European country, but the Russian crop fell from 214,050,000 lb. in 1905 to 162,020,000 lb. in 1906, with the result that in the latter year, Austria-Hungary headed the European list with an output of 187,253,000 lb. At least 100,000,000 lb. were produced in Turkey, and the German crop of 1906 was 70,734,000 lb. Other producing countries are France, Italy, and Belgium. In South America, 103,717,000 lb. of tobacco are annually grown, more than half of which is produced in Brazil. The Java crop reached 109,250,000 lb., and in Africa, Algeria is the first tobacco-growing country with a yield of 11,668,000 lb.

British Guiana Industrial School.

Cacao, coffee, and rubber form the chief crops grown at the Onderneeming Industrial School, British Guiana, and the agricultural teaching which the boys at the institution receive, in connexion with the cultivation of these and other crops should be of considerable value to them as a means of earning a living on their discharge.

The produce sold from the school farm in 1907-8 shows a total value of $2,548·96, while the net profit on the working of the farm for the year was $686·92.

Considerable improvements have lately been made on the cultivated land. The coffee crop for the past year reached 5,372 lb., compared with 3,250 lb. in 1906-7.

The weather conditions during part of the season were unfavourable for cacao production. The yield of cacao was 1,814 lb., while in 1906-7 it was 2,189 lb. The 1908-9 crop, however, has already reached 2,445 lb. Hevea, Castilloa, Funtumia, and Sapium rubber trees are under cultivation at the school. The Funtumia plants are doing especially well.

Rubber at St. Lucia.

Rubber plants (Castilloa, Hevea, and Funtumia) have been raised in considerable number at St. Lucia Botanic Station, and some estates have made experimental plantings. In 1906-7, the number of rubber plants distributed from the station was 18,167, of which, however, only some 7,000 were planted in the island. In 1907-8, the total number sent out fell to 7,438, of which only about 2,000 were distributed locally, and the Curator states that at present there is practically no demand for rubber plants at St. Lucia. The plantings already made will continue to be kept under observation and experiment, and a good stock of plants still exist at the Station.

A consignment of ten packages of seeds of *Hevea brasiliensis*, comprising a total of 2,059, was received from Ceylon in the past year. The seeds were packed in charcoal dust, and were altogether about two months in transit. Of the seeds received, 947, or about 46 per cent., germinated. Observations on the condition of the packages on arrival indicate that the best results were obtained from the seeds in those tins in which, on arrival, the charcoal dust was dry.

The Curator, in his latest *Annual Report*, expresses the opinion that Castilloa rubber trees will thrive exceedingly well in St. Lucia, if due consideration is given to the selection of suitable soil and locality.

Rapid Germination of Seeds.

One or two methods of treatment are known by means of which the germination of seeds may be accelerated in a remarkable manner, and although this rapid germination is of no practical value, an explanation of the methods by which it is brought about may not be without interest.

If seeds are treated with chlorine water (two drops of chlorine to 60 c.c. of water) and then stood in the sun, they will germinate completely in six hours. The seeds must be removed from the chlorine water, and washed, however, directly the radicle appears. Chlorine has a decomposing effect on water in the presence of light, breaking it up into hydrogen and oxygen, and the rapid germination is due to the action of the nascent oxygen liberated by the chlorine. Hard seeds need a preliminary soaking in water before steeping them in chlorine solution. Alkaline substances, e.g., ammonia, soda, etc., in highly dilute solution, also aid the process of germination.

Another curious method consists in watering the seeds with a solution of formic acid (1 in 5,000) at a temperature of 25°-30° C. This treatment dissolves the integument, and plants which normally require eight or ten days will germinate in as many hours.

In some experiments carried out last year in France, and described in *Le Jardin*, seeds of radishes and other Cruciferae were made to germinate in less than eight minutes by plunging them in hot water, and then laying them between rags soaked in boiling water in a small flower-pot nearly filled with moist earth, and kept at a warm temperature.

GERMINATION EXPERIMENTS WITH PARA RUBBER SEED.

It is well known that the germinative capacity of the seed of *Hevea brasiliensis* is frequently disappointing, more especially in the case of samples that have undergone any lengthy journey in transportation from other countries before being sown. The results of experiments carried out in Ceylon to test the germinating power of various samples of Para rubber seed should therefore prove of interest. Tese trials are described in *Circular No. 11—Vol. IV*, issued from the Royal Botanic Gardens, Ceylon.

The investigation yielded the very definite result that in a few weeks the seeds lose their power of germinating. Seeds from untapped trees failed to germinate after being kept for three or four weeks. Seeds from trees that had already been tapped for rubber showed a higher percentage of germination, and somewhat better keeping properties than those from the trees which had never undergone tapping; otherwise they were smaller than the seeds from untapped trees, and would presumably yield less oil if they were crushed for that purpose.

MAIZE BREEDING IN THE UNITED STATES.

'Ten Generations of Corn Breeding' is the title of an interesting bulletin (No. 128) lately issued by the Illinois Agricultural Experiment Station. In this pamphlet are brought together the results of a long series of experiments in corn selection and breeding that have been carried on at the Illinois Station since 1896.

A single variety only, known as 'Illinois' corn, was employed at the start, and in working towards the improvement of the variety, the results of chemical analysis of the grain were adopted as the basis of seed selection. It was found that although there is a wide variation in the chemical composition of different ears of the same variety of corn, yet a single ear is approximately uniform throughout in the chemical composition of its kernels.

In carrying out these experiments in seed selection and breeding, the officers in charge set before themselves the object of developing and fixing four separate strains from the original variety.

In one strain seed selection was annually continued with the object of increasing, so far as possible, the protein (or albuminoid) content of the grain. In the nutrition of man and animals protein is the most expensive of all food constituents, and stock-breeders especially realize the value of a food with a high protein content.

A second strain was bred for the purpose of decreasing so far as possible the protein content, or, in other words, to increase the proportion of starch. This line of work was taken up as there is a demand from the manufacturers of starch, gum, dextrin, and alcohol for a grain rich in carbohydrates, and consequently with a low proportion of protein matter.

Strains 3 and 4 of the maize were bred respectively, for maximum and minimum content of oil. Maize oil has now found such a wide commercial use that it has become, pound for pound, by far the most valuable constituent of the grain. On the other hand, there is a practical use for a corn with a low oil content, since in feeding swine, for instance, the oil in maize tends to produce a flabby quality of flesh, which is very undesirable. The object of breeding corn for a decreased oil content is therefore apparent.

The four strains of corn under experiment were, of course, grown every year in four separate seed-beds. No artificial hybridization was attempted, but pollination from sources outside the particular plot was prevented, so far as possible, by every available means. On the other hand, self-pollination was prevented by 'detasselling' the plants in alternate rows, and selecting seed only from the detasselled maize plants.

The work reported upon in the bulletin under consideration has certainly been attended with satisfactory results. Starting with a variety of maize of average composition, it has been found possible to increase the average protein content of strain No. 1 from 10·92 to 14·26 per cent., to decrease the average protein content of strain No. 2 from 10·92 to 8·64 per cent.; with strain No. 3 to increase the average oil content from 4·70 to 7·37 per cent., and with strain No. 4 to decrease the average oil content of the grain from 4·70 to 2·66 per cent. In other words, out of a single variety of corn, two strains have been developed, of which one is now almost twice as rich in protein as the other, and two other strains have been developed, one of which is now nearly three times as rich in oil as the other.

In the course of the work, variations among individual ears were found, ranging in protein content from 6·13 per cent. in the low protein strain to 17·79 per cent. in the high protein strain, and in oil content from 1·60 per cent. in the low oil strain to 8·59 per cent. in the high oil strain.

It is mentioned that selection for high protein content of the grain is apparently accompanied by a reduction in the total yield. In the other strains, the yields for the most part have been maintained, in spite of the rigorous selection for the special chemical characteristics.

RENOVATING WORN-OUT LAND.

The progress that was made during a period of three years in building up a worn-out cotton plantation in Arkansas into a profitable stock and forage producing farm is described in *Farmers' Bulletin 326* of the United States Department of Agriculture. The cultivation of cowpeas and other leguminous crops proved the chief agent in the restoration of fertility, while careful cultivation and the application of artificial manure assisted the work.

In 1905, the estate produced ¼-bale of cotton, and 15 bushels of corn per acre; in 1906, after a crop of cowpeas had been cultivated, it produced ½-bale of cotton and 37½ bushels of corn per acre, and in 1907, after a second crop of cowpeas, ½-bale of cotton and 34 bushels of corn were grown to the acre. On a portion of the land, a crop of cowpeas was grown, and 300 ℔. of mixed artificials were applied. This resulted in nearly ¾-bale of cotton per acre, and when cowpeas were grown continuously for two years, nearly 1 bale of cotton per acre was produced.

Deep ploughing was practised, and the corn and cotton were planted in rows at right angles to each other, cultivation being carried on both ways. The cowpeas were grown in rows 3 feet 6 inches apart.

From a plot one-tenth of an acre in area at the St. Kitt's Experiment Station, 1,650 lb. of onions, of the white Bermuda variety, were obtained last season. The seed was first sown in nursery beds, and the young seedlings were transplanted out when about a month old.

STUDENTS' CORNER.

Seasonal Notes.

DECEMBER.

1st Fortnight.

Note what varieties of cane are being planted: look up and read what is said concerning them in the reports on sugar-cane experiments issued by the Imperial Department of Agriculture. Also ascertain from planters the peculiarities exhibited by the different varieties of cane.

Go through the cacao plantations and examine the trees for different diseases. Study the precautions and the remedies against diseases given in the publications of the Imperial Department of Agriculture.

Make a study of the various scale insects found on lime trees. Try to learn what natural agencies keep them in check, and learn what remedial measures may be resorted to.

Continue the search for desirable cotton trees for seed selection. Look out for such diseases as leaf-blister mite and black scale; if these are discovered, try to ascertain how and in what direction they spread.

QUESTIONS FOR CANDIDATES.

PRELIMINARY QUESTIONS.

(1) What do you mean by 'light' and 'heavy' soils respectively? Fill a measure (such as a kerosene tin, or a smaller tin) with sand, then with clay, and then with mould and other soils, and note if the 'heavy' or the 'light' soils weigh most.

(2) What changes take place if you burn a sample of soil?

(3) Why is it necessary to drain certain soils? How is the residual water necessary for plant growth retained in a soil that is efficiently drained.

INTERMEDIATE QUESTIONS.

(1) Describe the principal manures which are useful as providing nitrogen.

(2) Discuss the question of deep ploughing in connexion with the soil in your neighbourhood.

(3) What implements would you use for weeding and maintaining a dust mulch? How deep would you allow the implement to penetrate in the case of (*a*) a fallow field (*b*) one bearing young plant canes?

AGRICULTURE AT ST. VINCENT.

The trade returns of St. Vincent show that the chief exports from the island during 1907-8 were cotton and cotton-seed (valued at £33,133), and arrowroot (valued at £25,555). A long way below come cacao, of which the exports for the year were valued at £4,960: live stock, which were shipped to the value of £4,781: muscovado sugar (£3,172), vegetables (£2,213), ground nuts (£1,589), and cassava starch (£1,296). The increase in the output of cotton, and the steady advance that has of late years been shown in the production of cacao are the chief points worthy of note.

The *Annual Report* (1907-8) on St. Vincent contains the following notes in reference to the agricultural industries of the island:—

Arrowroot still holds the first place in area of cultivation, but cotton this year has overtopped it in value as an export.

The Sea Island cotton export in 1907-8 was 388,833 lb., as against 225,632 lb. in the year previous, the area in cultivation being 3,200 and 1,534 acres respectively.

The yield did not quite come up to the anticipations, and planters are learning the lesson that land *must* be well selected, prepared, and manured, and the cultivation most scrupulously cared for in all stages, if the best results are to be obtained.

It is greatly to be hoped that some improvement in price will take place before the next crop sales, and as the serious fall has been attributed to the general money disturbance occasioned by the recent American crisis, whereby the demand for the extra fine goods, for which this quality of cotton is required, has temporarily diminished, there are reasonable expectations that the sale conditions at the end of this year will be better.

The Central Cotton Ginnery erected in 1903-4 still remains under the successful management of the Imperial Department of Agriculture. The rate charged for ginning and baling is 1*d*. per lb., and the profit on the handling of the crop amounted to about £600.

One new private ginnery has been established in Kingstown with three gins, which has been of assistance in handling the largely increased crop, and another, with two gins, is at work on the leeward side of the island.

The disintegrator for crushing cotton seed has been used to some extent, one proprietor having some 40 odd tons of seed crushed for the purpose of manure for his cotton lands.

The sugar industry may be said to be only just alive. Some cultivation there must always be, for the sake of the rum manufacture, and as an incentive to attract and keep a supply of labour; but except for an output from the Carib country, where 160 odd acres have been planted with canes by the proprietor as a first step to the restoration of the land, the prospect of any large agricultural activity in this direction is practically nil.

On the Land Settlement Estates, matters are progressing fairly, and this year an appreciable quantity of cacao from the various small holdings was marketed.

RICE REPORT FROM BRITISH GUIANA.

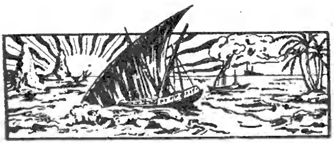
Messrs. Sandbach, Parker & Co., of Georgetown, in their fortnightly report, dated November 27 last, write as follows in reference to the present situation as regards the rice industry in British Guiana:—

Showery weather has prevailed during the past fortnight and milling has been considerably retarded, deliveries of rice to town being, in consequence, very short. The rains have also caused some small damage to reaped paddy that is still in the fields.

Shipments of rice to the West Indian Islands during the fortnight amount to 2,600 bags, and further sales are reported.

The price of paddy has again advanced. Growers are very independent and will not sell except at fancy prices, taking full advantage of the present competition among the millers to obtain all they can for their produce.

Present prices for good export quality rice, f.o.b. at Georgetown: 18*s*. 6*d*. to 19*s*. per bag of 180 lb. gross, and 17*s*. to 17*s*. 6*d*. per bag of 164 lb. gross.



GLEANINGS.

Sugar shipments were made from British Guiana in October last to the extent of 21,703 tons. Of this quantity, 10,373 tons went to Canada, 7,233 tons to the United States, and 4,054 tons to the United Kingdom.

In the first nine months of 1908, the fruit exported from Dominica (exclusive of limes) was as follows: bananas, 3,295 bunches; cocoa-nuts, 300,238; oranges, 232 barrels and 701 boxes; and a quantity of mangos valued at £69.

On the motion of Mr. S. C. Thorne, a Committee of the Barbados House of Assembly, consisting of Messrs. Thorne, Jackman, Robinson, Sealy, and Clarke, has been appointed to draw up a scheme for the establishment of central sugar factories in the island.

Heavy, but very partial showers of rain were experienced in some districts of the parishes of St. Michael and Christ Church, Barbados, on the morning of November 30. While some estates received no rain at all, on others the fall varied from 1·5 inches to as much as 5 inches in one case.

According to the latest *Annual Report* (1907-8) of the Board of Agriculture of British Guiana, the total estimated numbers of live stock in the country districts of the colony are as follows: horses, 1,850; donkeys, 5,750; cattle, 72,000; sheep, 17,200; goats, 13,500; swine, 13,200.

All the ground provisions consumed at the St. Lucia Agricultural School are produced at the Experiment Station carried on in connexion with the institution, the necessary labour for which is largely supplied by the pupils. Valuing the provisions at market prices, the saving effected in this way during 1907-8 amounted to £42 7*s.* 10*d.*

The cultivation of sugar-cane and cotton form the chief agricultural industries of the Brazilian State of Pernambuco. In 1907 the sugar crop of the State was 1,478,462 bags, each of 165 lb. The 1908 crop is estimated at 1,800,000 bags. Cotton was produced in 1907 to the extent of 278,557 bales, each of 165 lb.

The following form the main results of experiments carried out in Illinois to ascertain the most suitable distances of planting maize: on land that ordinarily produces more than 50 bushels of grain per acre, the best return was given when the seed corn was planted in hills at distances of 39·6 inches each way, with three grains per hill. In the same district, on land that ordinarily produces less than 50 bushels of grain per acre, corn planted in hills 36 inches each way, with two kernels per hill, has yielded the largest return.

In view of the increasing scarcity of the Guayule rubber plant (*Parthenium argentatum*) in Mexico, attention is being paid to the tree known as 'Palo amarillo' (*Euphorbia fulva*, Stapf.). This tree is reported to yield about 10 per cent. of rubber, and 40 per cent. of resin and soap-making materials. 'Palo amarillo' occurs wild in large quantity in Mexico.

The total area under rice cultivation in British Guiana for the 1907-8 season (29,715 acres) comprised 12,366 acres in Berbice, 9,684 acres in Demerara, 4,113 acres on the Essequibo mainland, and 3,552 acres on the adjoining islands. The total yield was 36,930 tons of paddy, equal to 27,150 tons of cleaned rice. (*Board of Agriculture Returns.*)

Ground nuts form the main product of the colony of Gambia, West Africa. In 1907, the quantity exported amounted to 40,858 tons, of the value of £256,685. Large quantities of maize and rice are also grown, the latter being the chief food of the natives. During 1907, rice was exported to the quantity of 7,094 tons. (*Annual Report*, 1907.)

A fine specimen of the Shea butter tree (*Butyrospermum Parkii*), an important economic plant of West Africa, exists at the Dominica Botanic Station. It was obtained from Kew in 1899, and has always kept in vigorous condition. The tree flowered for the first time in 1907, and has again flowered and fruited in the present year.

Twenty-one grants of Crown land, amounting altogether to 68 acres, were made at St. Vincent during 1907-8. The Crown land which the Government of the island now have for disposal is nearly all mountain land, suitable only for provision ground. The price varies from £1 per acre to something over £3, according to the nature and locality of the land, and the system of payment arranged.

The official returns relating to exports from Dominica show that during the nine months ending September 30 last, the shipments of limes and lime products were as follows: fresh limes, 18,918 barrels; pickled limes, 536 barrels; raw lime juice, 138,810 gallons; concentrated juice, 60,012 gallons; lime-juice cordial, 16,800 gallons; citrate of lime, 1,603 cwt.; distilled lime oil, 2,490 gallons; expressed lime oil, 465 gallons.

One result of the decline of the sugar industry at St. Vincent has been a largely increased scarcity of green food for cattle. The stock kept at the Agricultural School are mainly fed on Guinea corn grown for the purpose. It is recommended that this crop be sown in September and October, and owing to its properties as a drought-resisting plant, it can be relied upon to give a supply of fodder in the dry season.

As in the case of many other of the West Indian Islands, all plants, seeds, bulbs, etc., imported into St. Lucia have to undergo fumigation, in order to prevent the possible introduction of destructive insects. This is carried out at the Botanic Station of the island. In 1907-8, the number of packages received and dealt with at the Station was 164. The process of fumigation lasted an hour in every case, and the results of experiments go to show that the operation is thoroughly satisfactory. The foliage of plants suffer little damage from the gas.

ST. LUCIA: ANNUAL REPORTS ON THE BOTANIC STATION, AGRICULTURAL SCHOOL, AND EXPERIMENT PLOTS, 1907-8.

The total expenditure in connexion with the St. Lucia Botanic Station during 1907-8 was £633 18*s*. 4*d*., this being less by £175 15*s*. 5*d*. than the sum expended last year. An amount of £55 16*s*. was realized from the sale of plants, seeds, and produce.

The returns relating to the distribution of economic plants are very satisfactory. Altogether, 74,644 plants were sent out from the two nurseries at the Botanic Station and the Agricultural School respectively. The demand for lime plants is especially noticeable, no less than 56,425 having been distributed. The number of cacao plants sent out was 7,017.

Rubber seeds (Hevea) were imported from Ceylon during the year, although the percentage of germination shown by these seeds was hardly satisfactory. A considerable number of grafted mangos and budded oranges of good varieties were raised at the Station, and distributed to school gardens in the island, being paid for by the Agricultural Society.

The rainfall experienced at the St. Lucia Botanic Station for the year 1907 was 71·33 inches, this being 10·51 inches below that of 1906, and 4·55 inches below the average fall of the past four years.

In regard to the Agricultural School, the total expenditure on this institution, and the experiments carried on in connexion with it, amounted to £865 4*s*. 2*d*., excluding the salary of the Officer-in-charge. In addition, a sum of £34 12*s*. 8*d*. was spent on 'special services' connected with the cacao and cotton experiment plots. The plants, vegetables, and live stock produced at the school, part of which was consumed, and part sold, represented a total monetary return of £113 10*s*. 9*d*.

The average number of boys maintained at the school during the year was 20·6. Several new pupils have been admitted. The health of the boys has been good throughout the year, and the results of the half-yearly examinations were fairly satisfactory.

The boys continue to receive regular instruction in practical agricultural operations, including the methods of grafting, pruning, etc. During the past year, in addition to the usual work, they have had experience with cotton throughout the different stages of treatment in the field and ginnery, as well as in opening up new land, and starting cacao plantations. Under a scheme recently established, provision has been made whereby a few pupils, who have completed their course of training with credit, may be appointed to posts as 'improvers' at the Department's stations. These appointments are tenable for eighteen months and afford the holder valuable opportunities for increasing his agricultural knowledge.

The area devoted to experimental work at the school was considerably extended during the year 1907-8, and it has been decided that the cacao area may with advantage be increased to 20 acres, with the object ultimately of providing revenue towards the upkeep of the institution. A start was made in this direction during the past year.

Experiments with limes, oranges, and lemons have been continued. Considerable interest is being shown in lime planting at St. Lucia, and in addition to those distributed by the Agricultural Department, large numbers of lime plants have been raised in private nurseries in the island. Experiments with provision and other crops are also in progress.

A number of live stock of various kinds continue to be kept at Union. These include the Ayrshire bull 'Gipsy Star of Bellevue', and a fine ram, 'Egba', of the African woolless breed.

BRITISH GUIANA: ANNUAL REPORT OF THE BOARD OF AGRICULTURE, 1907-8. By Professor J. B. Harrison, C.M.G., Chairman.

This report contains an account of the subjects dealt with by the Board at the three general meetings that were held during the year. The work done at the meetings of the various Committees is also summarized.

The sale of live stock held by the Board in December 1907 was well attended, and good prices were obtained. Among the animals sold were two half-bred Guernsey bulls. The total amount realized from the sale was $968·10. The live stock imported during the year comprised a Shorthorn bull (which, unfortunately, has since died of Texas fever), two Shropshire rams, and a Berkshire boar. All these animals were purchased from Canada. Two young bulls, of the Hereford and Red-polled breeds respectively, were obtained from Trinidad in March 1908, at a cost of $158·96, and the Live Stock Committee has decided to import, during the financial year 1908-9, a pure-bred bull immune from Texas fever, and two rams.

During the year, $54·60 were paid into the Treasury as fees for the services of bulls belonging to the Board. The fees for the services of rams were $4·08, while a sum of $15·12 was realized by the sale of chickens and eggs from imported fowls kept at the Botanic Gardens.

The two horse stallions belonging to the Board cost $837·76 for maintenance during the financial year, while fees for their services in different parts of the colony amounted to $580.

Two Agricultural Exhibitions were held in British Guiana in 1907-8, one by the Buxton Farming Association, while the second was a County Agricultural and Live Stock Exhibition, held at Suddie. The exhibits at the former were few in number, and, generally speaking, poor in quality. At the Suddie Show, the display of produce was poor, but the live stock on view were more satisfactory.

The returns obtained and published by the Sugar-cane Experiments Committee of the Board show that the area in the colony under cultivation with varieties of cane other than the Bourbon has increased from 28,800 acres in 1906-7 to 32,698 acres in 1907-8. The most notable increases are those of canes D. 625 and B. 208. The area under cultivation with the former cane has risen from 6,600 acres in 1906-7 to 9,662 acres in 1907-8, while in the same period the B. 208 area has advanced from 3,189 to 5,258 acres.

DEPARTMENT NEWS.

Mr. H. A. Ballou, M.Sc., Entomologist on the staff of the Imperial Department of Agriculture, accompanied by Mr. C. W. Jemmett, returned to Barbados from the Northern Islands, on December 5 last, by the C.L.S. 'Dahomé.'

ATMOSPHERIC NITROGEN AND THE MANUFACTURE OF CALCIUM CYANAMIDE.

Nitrogen is the most important and costly manurial constituent that has to be supplied to the soil in the cultivation of crops, and the increasing need of a supply in large quantity, and in a form suitable for fertilizing purposes, is being generally recognized by agriculturists. The ever-extending demand for nitrogenous manures, and the fact that available sources are being depleted, have caused investigators to give more and more attention to the question of the fixation of nitrogen from the atmosphere, in a suitable form, by electrical methods.

Two such methods, which are now fairly well known and have been put into practice on a commercial scale, are the Frank process of manufacturing calcium cyanamide or lime nitrogen, and the Birkeland-Eyde system of producing calcium nitrate. Notes and short articles relating both to the Frank and the Birkeland-Eyde processes have appeared in past numbers of the *Agricultural News* (Vol. IV, p. 70; Vol. V, pp. 191, 216, and 351; and Vol. VII, p. 135), but an article on the subject which appeared in a late number of *Nature* contains a few additional particulars.

In the Birkeland-Eyde process, ordinary atmospheric air is forced through an electric furnace under considerable pressure. Under the influence of the electric arc, the nitrogen and oxygen unite chemically, forming nitric oxide. The fumes are collected, and, after further oxidation, are absorbed in water towers, with the consequent formation of nitric acid. Calcium nitrate is produced when powdered quicklime is used for absorbing the oxide of nitrogen.

The Frank process of manufacturing calcium cyanamide represents the first method adopted on a commercial scale for producing an artificial manure containing nitrogen derived from the air.

Calcium carbide, which is so generally used as a generator of acetylene for lighting purposes, forms with atmospheric nitrogen, the basis of the manufacture of calcium cyanamide. The calcium carbide, which is produced by heating a mixture of chalk and coke in an electrical furnace, is powdered, and heated to a temperature of from 800°C. to 1,000°C. in an enclosed vessel, while a current of nitrogen gas is led over it until combination ceases. The nitrogen which is utilized in this process is obtained by passing a current of air through a tube filled with copper turnings. These turnings absorb the oxygen of the air, forming copper oxide, while the nitrogen is led through to the calcium carbide. The copper oxide can be readily reduced to the metallic state, and used again. The following chemical equation represents the reaction that takes place between the calcium carbide and the nitrogen gas:—

$$\begin{array}{ccccccc} CaC_2 & + & 2N & = & CaCN_2 & + & C. \\ \text{Calcium} & & \text{Nitrogen} & & \text{Calcium} & & \text{Carbon.} \\ \text{carbide} & & & & \text{cyanamide} & & \end{array}$$

(The symbols Ca, C, and N indicate the elements Calcium, Carbon and Nitrogen respectively; the small figure 2 by the C indicates that two atoms of carbon combine with one of calcium to form calcium carbide. Similarly, two atoms of nitrogen exist in a molecule of calcium cyanamide.)

The calcium cyanamide that has been formed is extracted in the form of a hard cake, and is cooled in vessels from which air is excluded. When cool, it is ground into a fine powder, and is ready for use.

During the past year a new electric furnace has been devised for heating the carbide while it is absorbing the nitrogen, and this has proved cheaper, and so satisfactory that all the older retorts have been replaced by the electrically heated ones.

Calcium cyanamide decomposes rapidly when heated with water under-pressure, and slowly with water at ordinary temperatures, ammonia and calcium carbonate being formed, according to the equation:—

$$\begin{array}{ccccccc} CaCN_2 & + & 3H_2O & = & CaCO_3 & + & 2NH_3. \\ \text{Calcium} & & \text{Water.} & & \text{Calcium} & & \text{Ammonia.} \\ \text{cyanamide.} & & & & \text{carbonate.} & & \end{array}$$

Probably the decomposition of the manure in the soil takes place in part as represented by the above equation, while other reactions also go on. Urea is believed to be one of the early products of decomposition.

Experiments referred to in the *Agricultural News* (Vol. V, p. 216) have shown that calcium cyanamide has a fertilizing value but slightly inferior to that of nitrate of soda, and somewhat superior to that of sulphate of ammonia. The cyanamide, as placed on the market, frequently contains a small proportion of free lime. It should not be mixed with superphosphate before application to the soil, as the free phosphoric acid of the latter combines with the lime of the cyanamide. It has been pointed out that calcium cyanamide should never be applied to soil deficient in lime, as under such circumstances its action tends to be distinctly harmful. A dressing of lime should always be given previously in such cases.

The first plant for the production, on an industrial scale, of lime nitrogen was started in Italy nearly three years ago. This factory has so far turned out 4,000 tons of cyanamide per year, and the works are now being increased to an annual capacity of 10,000 tons. Works have also been erected in other parts of Italy, as well as in Austria-Hungary, France, Germany, etc. In the United States the American Cyanamide Company are constructing works on the Canadian side of Niagara Falls, with a capacity of from 5,000 to 6,000 tons per annum. A British enterprise is in operation at Odda in Norway.

In the production of calcium cyanamide an amount of energy equal to about 3 horse-power per year is required to fix each ton of nitrogen, including the grinding and other mechanical operations. It may be mentioned that the amount of Chili saltpetre (nitrate of soda) exported in 1907 was 1,740,000 tons, and in order to replace this by the fixation of atmospheric nitrogen, it is necessary to employ 280,000 tons of the gas, and this is the amount which, it is calculated, is contained in the atmosphere over every 9 acres of the globe. On the basis of the above estimate, plant developing no less than 800,000 horse-power would be required to produce calcium cyanamide in quantity sufficient to take the place of all the Chili saltpetre at present consumed each year.

Beet Sugar Production in Europe. The output of beet sugar in Europe has shown a steady, if somewhat small, decline in recent years. The total European sugar crop was 6,932,000 tons in 1905-6, 6,710,000 tons in 1906-7, and 6,552,000 tons in 1907-8. In 1905-6, Germany produced 2,418,000 tons; the crop fell to 2,239,000 tons in 1906-7, and to 2,135,000 tons in 1907-8. The Austro-Hungarian beet sugar crop of 1907-8 was 1,440,000 tons, as compared with 1,510,000 tons in 1905-6. France produced only 725,000 tons in 1907-8, as against 1,090,000 tons in 1905-6. Belgium and Holland show a similar decline. The Russian crop was 968,000 tons in 1905-6; 1,440,000 tons in 1906-7, and 1,410,000 tons in 1907-8

WEST INDIAN PRODUCTS.

Drugs and Spices on the London Market.

Mr. J. R. Jackson, A.L.S., has forwarded the following report on the London drug and spice markets during the month of October:—

The state of the spice and drug markets during the month of October has continued pretty much in the same condition as it has been for several months past. Though the supply of goods has been fair, and sometimes even full at all the auctions, and a better tone was apparent about the middle of the month, nothing more than a normal demand has marked the character of business generally. From the following notes, it will be seen that West Indian products have proved no exception to the rule.

GINGER.

At the first spice auction held on the 7th, the demand was very slow. No Jamaica was offered, and the bulk of the 200 packages of Cochin and Calicut was bought in, good brown rough Calicut at 40*s.* per cwt. and sound at 35*s.* Some 70 cases of Calicut, including unsorted native cut and small cut, were also bought in, the former at 55*s.* and the latter at 52*s.* per cwt. Some 145 bags of wormy washed rough Cochin were offered, only 15 of which were disposed of at 32*s.* 6*d.* per cwt. On the 14th of the month, Jamaica was represented by 170 packages, only 50 of which were sold at prices including good common at 52*s.* to 54*s.*, and good at 58*s.* to 62*s.* Washed rough Cochin was bought in at 35*s.* A week later no Jamaica was offered, and the offerings of Calicut were bought in at 90*s.* for bold cut, 70*s.* for medium cut, and 52*s.* to 57*s.* 6*d.* for unsorted native cut. Of another lot, good bold Calicut was held at 45*s.* and slightly wormy brown rough at 35*s.* per cwt. At the last auction on the 28th, ginger was still in very little demand; only 5 barrels of Jamaica were offered, and these were bought in. Twenty-four packages of Cochin and Calicut were brought forward, and only 2 cases of Calicut were sold at 68*s.* per cwt. for medium cut; 41*s.* and 40*s.* were the prices at which bright brown Calicut and bold limed rough Calicut were respectively bought in.

NUTMEGS, MACE, AND PIMENTO.

The offerings of nutmegs in the earlier part of the month were unimportant. At the auction on the 28th, 330 packages of West Indian were offered, and the bulk sold at steady prices for sound, the inferior and smaller sizes fetching ¼*d.* to ½*d.* per lb. lower than previous rates. There has been a steady demand for mace. Twenty packages of West Indian were offered at auction on the 14th, and about one-half was disposed of at the following rates: 1*s.* 1*d.* to 1*s.* 2*d.* per lb., for fair; 1*s.* 2*d.* for good broken, and 11*d.* for pickings. The latest prices obtained for West Indian at the auction on the 28th were as follows: Fair pale, 1*s.* 5*d.* to 1*s.* 6*d.*; fair pale and reddish, 1*s.* 3*d.* to 1*s.* 4*d.*; good red, 1*s.* 2*d.* to 1*s.* 3*d.*; and broken, 11*d.* to 1*s.* Some cases of Java also realized 2*s.* 1*d.* to 2*s.* 3*d.* for good bold reddish, and 1*s.* 5*d.* to 1*s.* 6*d.* for fair early. Pimento, at the first sale on the 7th, was quoted at 2¼*d.* per lb. for fair. A week later, 200 bags were offered at auction and some 150 sold at 2⅛*d.* per lb. for fair and 2*d.* for gray. On the 21st, the offerings amounted to 55 bags of siftings, which sold without reserve at 1¾*d.* per lb., and at the last sale on the 28th the offerings amounted to 720 bags, a small part only of which found buyers, at 2$\frac{1}{16}$*d.* per lb.

ARROWROOT.

There was but little demand for this article at the beginning of the month. At the spice auction on the 14th, 50 barrels of fair manufacturing St. Vincent were offered, and bought in at 2*d.* per lb.; and again on the 21st, though some 330 barrels of St. Vincent were offered they were all bought in at 2⅛*d.* to 2⅜*d.* per lb. for fair to good manufacturing, and 3¼*d.* to 3⅞*d.* for fine. At this sale, 14 kegs of Bermuda were disposed of at 2*s.* 9*d.* to 2*s.* 11*d.* per lb.

SARSAPARILLA.

At the drug auction on the 8th, 10 bales of Lima-Jamaica were offered, and all sold at from 1*s.* 4*d.* to 1*s.* 5*d.* per lb. for fair rolled quality. One bale only of native Jamaica, pale red, was brought forward, and sold at 1*s.* per lb. Of 2 bales of Guayaquil offered, one of fair quality was sold at 1*s.* 7*d.* per lb. No gray Jamaica was offered, but at the auction on the 21st, 62 bales were offered, and 59 sold at from 1*s.* 3*d.* to 1*s.* 4*d.* per lb., one lot realizing 1*s.* 5*d.* Two bales (all that was offered) of fair native red, slightly sea-damaged, fetched 1*s.* 1*d.* per lb., and 4 bales, out of 5 offered, of Honduras, sold at 1*s.* 2*d.* to 1*s.* 7*d.* for mixed qualities. Further arrivals of red and yellow native, and Lima-Jamaica were announced a week later, and will appear at the first auction in November.

TAMARINDS, CASSIA FISTULA, KOLA, ETC.

At the first sale on the 7th, 2 barrels of rather stony tamarinds from Montserrat were disposed of at 7*s.* in bond, and on the 14th some sales of West Indian in bond were made at 11*s.* 6*d.* per cwt. On the 28th, it was announced that several tons of Antigua had been disposed of at 9*s.* per cwt., and that Barbados, which were scarce, could well demand 11*s.* 6*d.* Cassia Fistula was offered at the drug sale on the 22nd, and sold at 19*s.* per cwt. for fair fresh West Indian. In the same week, 5 bags of fair dried West Indian kola, and 5 of mouldy seeds were disposed of at 1½*d.* and ½*d.* per lb. respectively, and a further sale of 7 packages of fair small dried West Indian at 1½*d.* per lb. was made a week later. Oil of lime was offered on the 21st to the extent of 11 cases, all of which were bought in at 2*s.* 6*d.* per lb. It was reported that frequent arrivals of the oil were taking place, including large quantities from Dominica. Two cases of West Indian distilled oil of pimento were also offered at this sale and held at 5*s.* per lb. Good pale raw West Indian lime juice was quoted at 1*s.* 3*d.*, and common brown and reddish at 11*d.* to 1*s.* Some 400 packages were announced as having arrived from Dominica. Chillies continue in fair demand, the quotations being for fair mixed yellowish Mombasa 30*s.*, and for good red Japan 50*s.*

MANGANESE IN SUBSOIL WATER.

The contamination of the drinking water of Breslau between two and three years ago, when, after an inundation of the collecting ground, from which the town was supplied, the whole of the water suddenly became so much contaminated with dissolved manganese as to be no longer fit for use, has rendered it necessary to seek the best and cheapest methods of freeing water from this substance. Dr. Röhrig, the Director of the Breslau Chemical Society, points out, as the result of a long series of experiments, that this can be most cheaply and successfully accomplished by treatment with caustic lime, after the water has, by preliminary treatment, been freed from iron. It was found that 3 cwt. of lime are sufficient to remove the manganese sulphate (which in this case was present at the rate of 10 milligrams per litre of water) from 40,000 cubic metres of spring water at a cost of about 3*s.* 6*d.* for chemicals.

MARKET REPORTS.

London,—November 24, 1908, The West India Committee Circular; Messrs. Kearton Piper & Co., November 24, 1908, Messrs. E. A. de Pass & Co., November 13, 1908.

Arrowroot—Quiet; 2*d.* per lb.
Balata—Sheet, 2/1 to 2/5; block, 1/7½ to 1/8.
Bees'-wax—No quotations.
Cacao—Trinidad, 58/- to 72/- per cwt.; Grenada, 50/- to 59/- per cwt.
Coffee—Santos, 24*s.* 3*d.* to 25*s.* 3*d.* per cwt.; Jamaica, no quotations.
Copra—West Indian, £18 per ton.
Cotton—St. Vincent, 14*d.* to 15½*d.*, and Barbados 13½*d.* to 14*d.*; West Indian Sea Island, good medium to medium fine, no quotations.
Fruit—
  Bananas—Jamaica, 4/6 to 6/- per bunch.
  Limes—Not wanted.
  Pine-apples—St. Michael, 3/- to 5/-.
  Grape Fruit—9/- to 12/- per box
  Oranges—Jamaica, 7/6 to 10/6 per box.
Fustic—£3 to £4 per ton.
Ginger—Quiet.
Honey—24*s.* 6*d.* to 32*s.* per cwt.
Isinglass—West India lump, 1/4 to 2/4 per lb.
Lime Juice—Raw, 10*d.* to 1/4 per gallon; concentrated, £16 5*s.* per cask of 108 gallons; distilled oil, 1/8 per lb.; hand-pressed, 4/6 to 5/- per lb.
Logwood—£3 to £4 5*s.* per ton; roots, £2 to £3 per ton.
Mace—Firm.
Nutmegs—Quiet.
Pimento—Firm.
Rum—Jamaica, 3/4; Demerara, 1/6 to 1/7, proof. Trinidad, no quotations.
Sugar—Crystals, 15/6 to 16/9 per cwt.; Muscovado, 14/3; Syrup, 11/3 to 12/-.; Molasses, no quotations.

New York,—November 13, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12½c. to 13c.; Grenada, 11½c. to 12¼c.; Trinidad, 12½c. to 13c.; Jamaica, 9¼c. to 10½c. per lb.
Cocoa-nuts—Jamaica, select, $25·00; culls, $15·00; Trinidad, $25·00; culls, $14·00 per M.
Coffee—Jamaica, ordinary, 7c. to 7½c.; good ordinary, 8c. to 8½c.; washed, 9c. to 11½c. per lb.
Ginger—10c. to 13¼c. per lb.
Goat Skins—Jamaica, 53c.; Antigua and Barbados, from 49c. to 51c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 48c. per lb., dry flint.
Grape Fruit—Jamaica, $2·50 to $4·50 per barrel.
Limes—No quotations. Market overstocked.
Mace—29c. to 31c. per lb.
Nutmegs—110's, 9½c. per lb.
Oranges—Jamaica, $4·00 to $5·00 per barrel; $1·75 to $2·25 per box.
Pimento—4c. per lb.
Sugar—Centrifugals, 96°, 3·94c.; Muscovados, 89°, 3·44c.; Molasses, 89°, 3·19c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. James A. Lynch & Co., November 16, 1908; Messrs. Leacock & Co., December 4, 1908; Messrs. T. S. Garraway & Co., December 7, 1908.

Arrowroot—St. Vincent, $4·00 per 100 lb.
Cacao—Dominica and St. Lucia, $10·00 to $11·00 per 100 lb.
Cocoa-nuts—$13·00 for unhusked nuts.
Coffee—Jamaica and ordinary Rio, $8·00 to $10·50 per 100 lb.
Hay—$1·25 per 100 lb.
Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $48·00; Sulphate of ammonia, $75·00; Sulphate of potash, $67·00 per ton.
Molasses—No quotations.
Onions—Strings, no quotations; loose, $2·00 per 100 lb.
Potatos—Nova Scotia, $1·75 to $2·00 per 160 lb.
Peas—Split, $6·50 per bag of 210 lb.; Canada, $3·55 to $3·65 per bag of 120 lb.
Rice—Ballam, $4·68 (180 lb.); Patna, $3·80; Rangoon, $3·00 to $3·10 per 100 lb.
Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, November 28, 1908; Messrs. Sandbach, Parker & Co., November 28, 1908.

Arrowroot—St. Vincent, $9·00 per 200 lb.
Balata—Venezuela block 32c.; Demerara sheet 56c. per lb.
Cacao—Native 16c. to 18c. per lb.
Cassava—80c.
Cassava Starch—$5·00 to $6·00 per barrel of 196 lb.
Cocoa-nuts—$12·00 to $16·00 per M.
Coffee—Creole 12c. to 13c.; Jamaica 12c. per lb., slow.
Dhal—$4·80 per bag of 168 lb.
Eddos—$1·32 per barrel.
Molasses—No quotations
Onions—Madeira, 2¼c. to 2½c; per lb.
Plantains—8c. to 24c. per bunch.
Potatos—Nova Scotia, $2·25 to $2·50 per 100 lb.
Potatos—Sweet, Barbados, $1·20 per bag.
Rice—Ballam, $5·90; Creole, $4·20 to $4·50; Seeta, $6·00.
Split Peas—$6·50 to $6·75 per bag (210 lb.); Lisbon, no quotations.
Tannias—$1·32 per bag.
Yams—White, $1·92; Buck, $1·92 per bag.
Sugar—Dark crystals, $2·12½ to $2·30; Yellow, $2·80 to $3·20; White, $3·70 to $3·80; Molasses, $2·00 to $2·10 per 100 lb. (retail).
Timber—Greenheart, 32c. to 55c. per cubic foot.
Wallaba Shingles—$3·75 to $5·75 per M.
———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—November 28, 1908.—Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·50 to $12·75 per fanega; Trinidad, $12·50 to $13·50.
Cocoa-nuts—No demand.
Cocoa-nut Oil—62c. per Imperial gallon, cask included.
Coffee—Venezuelan, 8¼c. to 8½c. per lb.
Copra—$3·00 to $3·10 per 100 lb.
Dhal—$4·50 to $4·60 per 2-bushel bag.
Onions—$1·50 to $1·60 per 100 lb. (retail).
Potatos—English, $1·25 to $1·30 per 100 lb.
Rice—Yellow, $5·40 to $5·60; White, $4·50 to $4·80 per bag.
Split Peas—$6·00 to $6·25 per bag.
Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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Science Teaching at Harrison College, Barbados.

IT is gradually becoming recognized that success in any branch of industry depends on the amount of scientific method which is brought to bear upon it. In no branch of industry is this more evident than in that of Agriculture. The planter who does not know the chemical composition of his soil and crops and the chemical changes taking place in them, the reasons why drainage and tillage improve the land, the life-histories of the insect and fungoid pests which attack them, and many other matters, is behind the times and must sooner or later give way to the scientifically trained man.

The value of a scientific training lies not only in the knowledge which it imparts, but above all in the habit of mind which it encourages. It makes the student observant, teaches him accuracy, trains him to think logically and clearly, and makes him self-reliant

In no part of the West Indies is the value of a scientific training as a preliminary to the profession of Agriculture becoming better recognized than at Barbados. Additional accommodation and apparatus for the teaching of Botany and Physics have recently been provided at Harrison College, and the local Government has recently placed on the permanent educational staff of the colony the Lecturer in Natural and Agricultural Sciences, whose services were formerly provided by the Imperial Department of Agriculture.

In consequence of this additional accommodation it has been possible to enlarge considerably the scope of the science teaching in the four lower forms at the College. Prior to 1907 the teaching in these lower forms was conducted entirely by means of chemistry lectures illustrated by experiments. Now the instruction is conveyed largely through the medium of practical work, and, in addition to chemistry, mensuration and elementary physics are also taught.

The special Agricultural Science course is open to boys whose education has reached the standard of the fourth form at Harrison College. Three hours a day are devoted to this work, which consists of lectures and practical work in the following subjects:—Systematic Chemistry, Agricultural Chemistry, Sugar Chemistry, Botany, elementary Physics, elementary Physiology, Principles of Agriculture, Cane and Cotton planting, and Sugar Manufacture.

Theoretical instruction is given by means of lectures amply illustrated by specimens and experiments, and the more technical subjects of the course are illustrated by excursions to sugar factories and plantations.

The practical Chemistry course consists principally of qualitative and quantitative chemical analysis. In qualitative analysis the students work through the reactions and separation of the commoner metals, acids, and salts. Throughout this course every reaction is explained, and the pupil is made to understand what he is doing and why he does it.

In the practical Sugar Chemistry course chief attention is given to the quantitative analysis of cane juice, syrup, molasses, sugar, and rum, and this work, when taken in conjunction with the practical Chemistry already referred to, should fit a student to take intelligent charge of the chemical control of a sugar factory.

Instruction in practical Botany at Harrison College has hitherto been hampered by the want of a properly equipped laboratory. This drawback has, however, now been removed, and pupils joining the class in future will have each a microscope, and be able to prepare, stain, and mount their own sections.

Two years are occupied altogether in going through the whole course of instruction. Examinations are held every year by the Cambridge Examinations Syndicate, who have appointed Mr. H. H. Cousins, M.A., the Government Chemist at Jamaica, as Examiner for the more technical West Indian subjects. Those who pass successfully in all the examinations are awarded certificates of proficiency in Agricultural Science. Since the inauguration of the class, in January 1900, twenty-seven boys have been awarded this certificate.

It will be seen, therefore, that the Agricultural Science course at Harrison College is an extensive and valuable one, and should go far to produce a generation of planters who will not only be alive to the benefits of science in their profession, but who will be ready and able to assist the scientific officers of the Agricultural Departments in their efforts to improve crops and cultural methods, and to combat disease.

As already mentioned, a training in science is particularly valuable on account of the orderly, observant, and accurate habit of mind which it encourages. The Agricultural Science class is, therefore, not only useful for boys intending to take up Agriculture as their life work, but is an excellent training for any profession. Increasing advantage is being taken of this class by boys who intend to study for the professions of medicine and engineering after they leave school. During the years 1900 to 1907 inclusive, seventy-four boys have passed through the whole or a part of the course: of these no less than twenty-three are known to have taken up Science, Medicine, or Engineering as their life work.

Those boys who have gone through the Agricultural Science class with distinction may pass on to the Scholarship Science Class, where they receive instruction in advanced Chemistry, Botany, and Physics. Since the year 1900 three Science students have succeeded in winning the Barbados Scholarship. This Scholarship, which is of the value of £175 a year for four years, is tenable at any British University approved of by the Education Board. It is competed for by boys under twenty years of age who may offer either classics, mathematics, or science. Two of those who took the scholarship in science went to Cambridge University, where one has already taken his degree with double first-class honours, and the other has passed the first part of the Tripos with first-class honours and won a Major Scholarship. The third will probably proceed to Edinburgh University next year.

FRENCH COLONIAL SCHOOL.

A useful institution, which may best be described as a Practical Colonial School, has lately been established at Havre, France, by an association of merchants. The object of the school (according to the *Journal d'Agriculture tropicale*) is to provide a specially adapted agricultural and industrial training for the pupils, whose services, it is hoped, will afterwards be particularly useful in exploiting the resources of the French colonies.

Lecturers have been chosen from among specialists in colonial affairs, who will give instruction in the culture of different crops, particularly that of cotton, and in colonial hygiene, and other matters pertaining to tropical countries.

The organization and co-ordination of the different Departments of the school have not yet been completed, and at present, the institution consists of a conference hall, a library of colonial publications, a collection of cotton ginning and baling machines of different types, and a colonial museum.

EXPERIMENT STATIONS, AND THE IMPROVEMENT OF TROPICAL AGRICULTURE.

An interesting editorial article in the *Experiment Station Record* for October last discusses in a general way the agricultural conditions that exist in the newly acquired tropical territories of the United States—Hawaii, Porto Rico, and the Philippines—and also the efforts that are being made through the medium of Experiment Stations to improve the systems of agriculture, and to introduce new crops and industries.

In all of the three countries named, but one, or at the most a very few crops have been produced in important quantity, i e., sugar in Hawaii, sugar and coffee in Porto Rico, tobacco and Manila hemp in the Philippines. This is a direct consequence of the system of agriculture practised, which is that of the large land-holder and employer of labour, and the absence of peasant proprietors. In working the large estates, the object has been to secure a maximum yield at a minimum outlay, which has, in many cases, resulted in the continuance of antiquated methods, and finally in the impoverishment of the soil. Under such circumstances, too, the labouring population were bound to remain in a backward condition.

Since the insular regions in question have become parts of the United States, efforts have been made to develop their agriculture through the establishment and working of Experiment Stations. Recognizing that the single crop system has proved remunerative to the employer, but has not contributed much to the general welfare of the community, the chief efforts of these stations have been directed towards increasing the number and variety of crops grown. At all the stations attempts are being made, not only to improve the present agricultural practices, but to introduce new crops and industries. In doing this, it is believed that not only will the producing capacity of the countries be increased, but that many small holdings will be developed and made profitable, and the general condition of the population improved.

The conditions peculiar to agriculture in the tropics, which in many cases make the work of the investigator more perplexing than if he were working in a region of temperate climate, are referred to, and in this connexion it is pointed out that seemingly antiquated methods of agricultural practice carried on by the natives are, after all, frequently the best, and their general adoption is the result of centuries of unconscious experiment on the part of the agriculturists. As an example in point, it may be mentioned that it was thought desirable in Hawaii and the Philippines to bring about a change in rice planting methods, and to replace the old system, which involves so much hand labour in transplanting the crop, by the introduction of machinery for drilling the seed in the rice field itself. But experiments carried out to test the results of the two systems show that the old method is the better. Not only were larger yields secured from transplanted rice, but the cost of production was decidedly less, taking all things into account.

At the conclusion of the article, reference is made to the slowness with which demonstrated results are taken up and applied by the community in whose interest the work is being carried on. The American experience has been that in the countries named, new crops and unusual methods appeal to but a few, and the progress made is not rapid. It is well known, however, that agriculturists are proverbially conservative all the world over, and not inclined to alter their methods unless it has been clearly and repeatedly demonstrated to them that it is to their own permanent interest to do so. In view of the short time that the Agricultural Experiment Stations have been established in Hawaii, Porto Rico, and the Philippines, they have fully met the expectations of those acquainted with their organization, aims, and resources.

THE SOY BEAN.

The attention of planters has frequently been drawn, by means of notes and short articles in the publications of the Imperial Department of Agriculture, to a number of crops, leguminous and otherwise, suitable for green manuring purposes in the West Indies. Experiments, too, have been carried on at the Stations in many of the islands to test the relative value of these different crops. The cowpea, the Bengal bean, and woolly pyrol are probably more extensively used as green dressing in the West Indies than any other crops, and their merits are generally well known. Another leguminous plant, to which attention was given in experiments at Antigua for the first time in 1907, is the soy bean (*Glycine hispida*). This bean is a native of south-eastern Asia, and has been cultivated from very ancient times in China and Japan. It is also grown in Java, and has of late years been introduced into India. The vines form excellent fodder, while the beans are frequently used as a food for man. The soy bean is a small erect plant. In the experiments at Antigua last year, its growth was healthy, but very small. It is thought that the weight of green matter produced might be increased by sowing the seed closer together, and further trials will be made.

A *Farmers' Bulletin* (No. 58) has been issued by the U.S. Department of Agriculture dealing with the soy bean. The following form the chief points of information given in this pamphlet:—

The soy bean thrives best in soils of medium texture well supplied with lime, potash, and phosphoric acid. It endures drought well, is not easily injured by excess of moisture, and may be grown about as far north as corn.

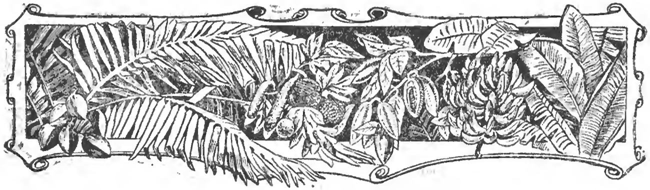
The early varieties are best for seed crops, and the medium or late varieties for hay, forage, and silage. Seeds may be planted at any time during the spring and early summer, but preferable as soon as the ground becomes well warmed up. Drill one-half to three-fourths of a bushel to the acre; broadcast three-fourths to one bushel.

Little cultivation is needed when growing for forage; when grown for seed keep weeds down until plants shade the soil. The soy bean may be used for soiling, pasturage, hay, and ensilage, or the beans may be harvested and fed as grain.

The forage is very rich in fat and muscle-making materials, and should be fed with fodder corn, sorghum, or some other feeding stuffs rich in fat-forming nutrients. The seed can be fed to the best advantage when ground into meal, and is almost without equal as a concentrated food.

Cut for hay when the plants are in late bloom or early fruit; for ensilage the crop can be cut later, but it is better to cut before the pods begin to ripen; for green forage, cutting may begin earlier and continue rather later than for either hay or ensilage; the crop may be cut for seed after the pods become about half ripe.

The soy bean is excellent for green manuring and for short rotation with cereal crops. It should be well limed when ploughed under as a green manure.



WEST INDIAN FRUIT.

HINTS TO FRUIT GROWERS.

Some seasonable hints to banana and orange growers appear in the November number of the *Journal* of the Jamaica Agricultural Society.

Small growers are advised to exercise more judgement in the time of planting their bananas, and also in selecting suckers. A plant banana requires from twelve to fifteen months from setting out to fruiting, and a ratoon sucker from eighteen to twenty months. The older the root is, the longer the time required by the sucker to come to maturity. Since the fruit fetches a good price for export in December and January, it is advised that suckers be selected and left to grow in July or August, and they may be expected to yield their produce at the desired time, about eighteen months later. Good stout suckers only should be left, and the more light and air they have, the quicker will they grow.

The fruit from early bearing orange trees will now have been gathered, and growers are advised to at once carry out any washing or spraying operations that may be necessary. A good wash for use in scrubbing the trees is made by adding boiling water to a mixture of lime and sulphur (4 of lime to 1 of sulphur). This should be prepared in a wooden tub, and rubbed on to the tree by means of a stiff brush. The mixture serves as an insecticide as well as a fungicide.

DECAY OF ORANGES WHILE IN TRANSIT.

The citrus fruit crop of California amounts to nearly 30,000 car-loads annually, having a gross value of about $30,000,000, of which oranges comprise from 85 to 90 per cent. The handling, shipping, and marketing of the above-mentioned enormous output of fruit now necessarily constitute a highly developed and well organized industry.

About 75 per cent. of the total output of oranges from California consists of the Washington Navel variety, the remaining 25 per cent. being chiefly Valencias, with small quantities of the St. Michael, Mediterranean Sweet, etc. The area planted with citrus fruits amounts to from 60,000 to 70,000 acres. The great bulk of the Californian orange crop finds its chief market in the Eastern cities of the United States. During transportation, a certain amount of decay takes place among the fruit, and the losses sustained in this way by the growers formerly amounted to from $750,000 to $1,500,000 annually. The whole subject of the decay of the fruit while in transit, and the influence of different methods of picking, curing, packing, and cooling the oranges upon their keeping properties, has formed the subject of a lengthy and exhaustive investigation carried out by the several officers of the Bureau of Plant Industry, U.S. Department of Agriculture.

The investigations made, and the conclusions arrived at, are embodied in *Bulletin 123* of the Bureau of Plant Industry, and the large amount of data there brought together should prove most valuable to orange growers and shippers. The investigations were carried out on a commercial scale, and under commercial conditions, with a view to securing accurate information in regard to the various phases of the citrus fruit industry.

The common blue mould *Penicillium glaucum* was always found associated with decaying oranges. This fungus was formerly considered to be purely saprophytic (i.e., to attack dead and decaying matter only), but inoculation of sound oranges has, without exception, resulted in the characteristic decay. Investigation has shown that the decay was preceded by mechanical injuries to the skin, most of which injuries were so small as to be invisible to the inexperienced eye. The most common forms of injury were caused by the clippers in cutting the fruit from the tree, stem punctures, and scratches and bruises in the packing house.

If the fruit is packed promptly after picking, and is shipped at once in a cool temperature, the decay may not develop in transit.

It was found very advantageous to lower the temperature of the fruit to 40° F. by placing it in cold storage, before packing in the compartments in which it had to travel. Even though the car was regularly iced, oranges packed at a fairly high temperature took a long time to cool when in transit.

SOILS FOR CITRUS FRUITS.

The influence of the soil on the quality of crop produced, more especially in the case of fruit trees, is discussed at considerable length in an article appearing in the *Rural Californian* for October last. The following extract relates to soil preferences shown by oranges and other citrus fruit:—

> Citrus fruits prefer soils with good surface and subsoil drainage, and with favourable exposures. Rich soils, when low and too moist, produce fruits low in acid and sugar, so that the citrus characteristics are practically lost. A deep soil is desirable, but when drainage is good, oranges and lemons often do well on soil no more than 4 feet deep, and resting on impervious hardpan. Under certain conditions even land of less depth has grown good orchards, but such land should only be planted when all the more suitable soils have been occupied.

SIR DANIEL MORRIS, K.C.M.G.

The accompanying note appeared in the London *Times* of November 7 last:—

At a recent meeting of the Council of the Royal Horticultural Society, Sir Daniel Morris, K.C.M.G., late Imperial Commissioner of Agriculture for the West Indies, was elected by acclamation an honorary life Fellow, in recognition of his valuable services to our Colonial Empire, and especially to the West Indies, and of his important work in promoting the sound financial organization of the Society, when Treasurer from 1887 to 1902.

We further learn that Sir Daniel has been elected a Vice-President of the West India Club, in succession to the late Sir Henry M. Jackson, G.C.M.G.

It may be mentioned, too, that at a meeting of the Dominica Agricultural & Commercial Society, held on November 30 last, the following resolution was unanimously adopted:—

Whereas Sir Daniel Morris, K.C.M.G., retires to-day from the position of Imperial Commissioner of Agriculture for the West Indies, which he has occupied for the past ten years,

And Whereas the Imperial Department of Agriculture, organized and directed by him with such conspicuous ability, has greatly helped in bringing prosperity to these agricultural countries,

Be it resolved, that the Agricultural and Commercial Society of Dominica places on record its admiration of his incessant and successful work, and expresses the hope that he may be long spared to enjoy the rest he has earned by his useful and well-spent official life.

COFFEE IN PORTO RICO.

Considerable efforts are being made by the officials connected with the Agricultural Experiment Station of Porto Rico to improve the conditions under which coffee is grown and prepared in the island. It is hoped to produce an article of such quality as will meet with a ready demand on the United States market.

A great number of the best varieties of coffee have been brought together at the station from many countries for the purpose of selecting for permanent planting those kinds which yield produce of the best quality. The most promising varieties are being distributed as quickly as possible.

In the hope of obtaining a better yield, the Experiment Station is conducting a number of manurial trials with fruit trees. A guano, containing a good proportion of phosphoric acid, with a smaller percentage of ammonia has been especially beneficial with young coffee plants.

Numbers of old coffee groves exist in Porto Rico, and the station has for some years past undertaken some experimental work with the object of showing how such old plantations may best be improved. An area of 10 acres was taken over in 1902 for this purpose. The total crop from the old trees, before any experiments were made, amounted to 3,387 lb. ready for market. The cost of harvesting and marketing the crop was $2·11 per 100 lb. After the crop had been gathered the 10 acres were divided into a number of plots, and experiments in green manuring with leguminous crops, distance tests, renovation of the trees by cutting them down to stumps to cause new growth, and different methods of cultivation, have been followed. By the end of 1907, a total of 1,106 trees had been removed, and the others trimmed. The yield has increased every year, and 4,349 lb. were secured in 1906.

The total cost of gathering and preparing 100 lb. of coffee for market is estimated at $1·33, and the average price obtained for the same amounts to $10·88. The net cost of new plantings of coffee to the end of the third year si estimated at $83·70.

From fifteen to twenty hours are considered sufficient for the fermentation of coffee in Porto Rico, while in some sections of Central America, as Guatemala, it must be carried on for two days. Undue prolonging of the fermentation causes a brown colouration of the parchment and of the seeds.

FIBRES FROM THE GOLD COAST.

Several specimens of fibres from the Gold Coast of Africa have lately been examined at the Imperial Institute, and a report on the results appears in the *Bulletin* of the Institute (No. 3, 1908). Below are given extracts from those portions of the report which relate to fibres from plants well known in the West Indies:—

Sansevieria fibre.—A sample of well-prepared Sansevieria fibre (probably from *S. guineensis*) was white, fine, of good lustre, of fairly even diameter, and of good strength. The product was 3 feet 9 inches long. The sample compared very favourably with specimens of Sansevieria fibre sent in to the Imperial Institute from other countries. The fibre was of excellent quality, and suitable for use with the finest Manila hemp; consignments of similar quality would be readily saleable at £60 per ton.

Plantain fibre.—The specimen of plantain fibre from the Gold Coast was well-cleaned, brownish-white, and of good lustre. The product was of fair, but very irregular strength, and about 4 feet long. The chemical composition of this fibre showed it to be superior to all other specimens of *Musa sapientum* previously examined at the Imperial Institute, and was regarded by commercial experts as being worth £40 per ton (with good Manila hemp at £38 to £42 per ton).

Banana fibre.—This sample consisted of brownish-white fibre, of good lustre, but uneven diameter, and very irregular strength. The product was about 4 feet long. This fibre was very similar to the preceding sample from the plantain, and the same remarks are applicable to it. Its composition, however, showed a slightly less percentage of cellulose. The fibre was valued at the rate of £36 per ton (with fair Manila hemp at £35 to £36 per ton).

Pine-apple fibre.—A sample of pine-apple fibre sent in for report consisted of well-cleaned, soft, white fibre, somewhat lustrous, of good strength, and about 3½ feet long. This length of staple is perhaps above the average. Pine-apple fibre does not come into the English market in regular quantities, but it might possibly be used as a flax substitute. The specimen in question was considered as being nominally worth £30 per ton.

Kapok.—Kapok, as is generally known, consists of the silky hairs which envelop the seeds of the tree known in the West Indies as the 'silk-cotton' (*Eriodendron anfractuosum*). The specimen from the Gold Coast was of dull, greyish-brown colour and good lustre, soft and silky, but somewhat 'felted,' and not very resilient.

Kapok is used as an upholstery material for stuffing purposes, and is worth about 6*d*. per lb. if clean and of good colour. The sample in question, however, was not worth more than 4*d*. per lb.

COTTON NOTES.

WEST INDIAN COTTON.

Messrs. Wolstenholme & Holland, of Liverpool, write as follows, under date of December 7, with reference to the sales of West Indian Sea Island cotton: —

Since our last report we have been in treaty with some of the largest buyers of Sea Island cotton, with a view to clearing off the balance of old stock of West Indian, with the result that between 1,000 and 1,100 bales have been sold on the basis of the prices ruling for Sea Island cotton to arrive.

The above sales include Antigua, Barbados, Nevis, St. Croix, St. Kitt's, St. Martin, and the Virgin Islands, and the prices range chiefly between 10¾*d* and 13¾*d*., with a few of the better qualities of Barbados at 14*d*. to 15*d*.

COTTON GROWING AT ST. VINCENT.

An article recently contributed to the *St. Vincent Sentry* by Mr. W. N. Sands, Curator of the Botanic Station of the island, deals with the present position of the cotton and arrowroot industries of St. Vincent.

It is pointed out that the market for arrowroot is uncertain, and that profits are limited. There does not appear to be any increase in the demand for arrowroot, but rather a decrease, and therefore the only wise plan is to turn to the careful cultivation of other products, which promise to be more remunerative. Chief among these is cotton.

In average years it may be taken that St. Vincent cotton will sell at prices ranging from 16*d*. to 18*d*. per lb., or thereabouts if the quality is kept up. In order to pay at these figures, every effort must be made to ensure a good yield (not less than ½-bale, i.e. 180 lb.) per acre. For the 1907-8 season, the average yield of lint per acre obtained by St. Vincent growers was 135 lb. only, and for the 1908-9 season it promises to be lower still.

The cause of this low return is undoubtedly due in large part to careless cultivation and deficient manuring, the crop in large numbers of cases being grown on poor or exhausted land.

In the hope of inducing growers to make every effort to improve the conditions under which the cotton crop is produced, and so to increase the yield, Mr. Sands offer the following suggestions, which may usefully be brought to the notice of planters and small holders outside of St. Vincent:—

'Practise a well-arranged rotation of crops, or some method of cultivation which will give the land a change and rest from cotton.

'Make greater use of leguminous and other plants for green dressing purposes. Among useful plants of this kind are pigeon peas, cow peas, woolly pyrol, etc.

'Return the cotton seed in some form or other to the land, and use pen or other organic manures more freely.

'Cultivate the land thoroughly.'

IMPORTANCE OF STRENGTH IN SEA ISLAND COTTON.

The following note, quoted from the official report of the proceedings of the Lancashire Cotton Conference held in August last, and which forms a summary of a speech made by Mr. E. Lomas Oliver, of the British Cotton Growing Association, emphasizes the great importance of strength of staple in Sea Island cotton:—

As pointing out how cotton altered its character, and the necessity of growing types of cotton suitable for the different soils and climatic conditions under which they were cultivated, Mr. Oliver stated that the results of growing St. Vincent cotton seed in Ceylon, 40 miles inland, were that the cotton had entirely changed its characteristics, but it had fully maintained its strength, and was a very good, desirable class of cotton. This showed that if the grower started with cotton which had strength, that character would be maintained, but he must point out that fineness by itself was of no use. It did not matter whether cotton was fine or coarse, long or short, but it must be strong; and he could not impress too earnestly on the growers that however fine and long the staple may be, their cotton would never fetch a good price unless it was also strong, and, provided this characteristic were present, spinners would rather buy shorter cotton than a soft, weak product, no matter how fine or how long it might be.

CACAO EXPORTS FROM TRINIDAD.

The shipments of cacao from Trinidad in the past November amounted altogether to 2,759,226 lb., which brings the total export since January 31 last up to 37,030,821 lb. In 1907, the shipments to the same date were 35,062,616 lb.

The United States form the chief market for Trinidad cacao, and on November last, the quantity shipped to that country was 1,657,806 lb. In the same month France took 686,145 lb., Holland, 188,100 lb.; Germany, 114,243 lb.; the United Kingdom, 102,032 lb.; and Canada only 1,000 lb.

London quotations for Trinidad cacao of 'ordinary', grade varied from 58*s*. to 62*s*. during the month of November.

AGRICULTURAL BANK IN CYPRUS.

The Annual Colonial Office Report (1907) on Cyprus states that an Agricultural Bank commenced operations in the island during the year, in accordance with an agreement entered into by the Government with the Anglo-Egyptian Land Allotment Company. Under this agreement the capital of the bank was not to be less than £100,000, and its principal business was to make advances to the agricultural and industrial classes of the colony upon security of immovable property, stock, agricultural and industrial produce, personal security, and such other security as the Company might determine.

The rate of interest was fixed not to exceed 9 per cent. per annum. The advantages of this bank have been greatly appreciated, and it has brought relief to many belonging to the classes for whom it was desired to provide a more reasonable system than that which had hitherto prevailed locally, of borrowing money for legitimate enterprise, or of tiding over temporary difficulties. To December 31, 1907, £308 had been lent for short periods, of which £165 had been repaid, while to the same date, but for longer periods, a total of £53,573 had been advanced.

LEGUMINOUS PLANTS AS SOIL IMPROVERS IN CACAO AND RUBBER PLANTATIONS.

In further reference to the utilization of certain leguminous plants as agents for the improvement of the soil in cacao plantations, concerning which a short article appeared in the last issue of the *Agricultural News* (page 389), it may be mentioned that considerable attention is being paid to this question of underplanting with green crops by the officials of the Federated Malay States Agricultural Department. Rubber trees, however, and not cacao, form the permanent crop under which planters in the Malay States are urged to make trial cultivations of the leguminous plants.

In connexion with the progress of rubber culture in the Malay States, the Director of Agriculture, in his latest *Annual Report*, raises the question as to whether clean weeding is advisable in permanent cultivations, under tropical conditions, or whether some more economical and equally satisfactory method of cultivation cannot be adopted.

Clean weeding undoubtedly ensures quick growth of young rubber trees, but objections are that all protection is removed from the surface of the soil, that a good deal of heat radiation and evaporation of moisture takes place which would otherwise be prevented, and that on sloping land the surface soil is frequently washed away by heavy rain. This entails a considerable loss of plant food. If the land is covered with some under crop, these disadvantages are removed, and the surface soil is kept moist and in the most suitable state for encouraging growth. The high cost in the Malay States, of continuous weeding operations carried out for many years, is a serious point to be taken into consideration in connexion with this matter of clean culture.

The Director of Agriculture mentions three plants, viz:—*Crotolaria striata*, *Mimosa pudica*, and *Desmodium triflorum*, which investigation appears to indicate that if grown under rubber trees, would enormously reduce the labour bill on estates by doing away with the necessity of weeding, and, it is thought, would not diminish the rapidity of growth of the rubber trees themselves. The three plants mentioned are well known in the West Indies, and might suitably be given a trial in cacao plantations. They all belong to the leguminous family, and would therefore be the means of enriching the soil by the supply of nitrogen assimilated from the air by the bacteria associated with their root system.

The Crotolaria is a quick-growing plant, which when sown thickly on good soil, and a sufficient rainfall is experienced, completely covers the ground with vegetation within a few weeks. Experiments carried out in Ceylon, in which Crotolaria was grown under cacao, showed that organic matter was added to the soil by the plant at the rate of 14,000 lb. per acre per annum, the nitrogen in this organic matter being equal to 700 lb. of nitrate of soda. No weeds can grow under the dense cover of the Crotolaria.

Mimosa pudica, or the 'sensitive plant', is cultivated as a green crop in connexion with sugar-cane planting in Fiji and one or two other countries. It grows readily, and does especially well under moist conditions.

The third plant, the Desmodium, is small, and grows only a few inches in height. It is somewhat difficult to establish, but when once it has been successfully started, it covers the ground with a thick, close turf.

AGRICULTURE IN THE FIJI ISLANDS.

The British colony of the Fiji Islands, it will be remembered, is situated in the South Pacific Ocean to the east of Queensland, and in latitude of from 16° to 21°. The islands comprise a total area of 7,451 square miles (or nearly twice the area of Jamaica), and the soil, in general, is of good fertility.

The staple agricultural products of the Fiji Islands, and the principal items of export are sugar, copra, and green fruit (chiefly bananas).

The total area under sugar-cane cultivation is 39,464 acres, which in 1907, according to the figures given in the *Annual Report* on the colony, yielded an average crop of 14·7 tons of cane per acre. The total export of sugar in 1907 was 66,597 tons, valued at £602,820. Six large up-to-date sugar-mills exist in the colony, which together are capable of turning out 420 tons of sugar per day.

Cocoa-nut plantations under European management extended to 28,634 acres, but native plantings also exist. The total quantity of copra exported in 1907 was 11,290 tons, valued at £182,788.

Bananas and pine-apples are cultivated over an area of 3,477 acres, exclusive of native plantings. Green fruit to the value of nearly £80,000 was exported in 1907. An Inspector has lately been appointed to supervise the export fruit trade, with the object of improving the grade of produce sent abroad.

An Agricultural Department was started in the colony in 1905, and two Experiment Stations have been established. Sea Island cotton formed the chief crop grown at one of these Stations, the lint obtained being shipped to the British Cotton Growing Association. This cotton was described as 'clean, very bright, long in staple, rather wanting in fineness and fairly strong,' and valued, in 1907, at 16*d.* per lb.

Experiments in the cultivation of rubber (Hevea and Ceara), cacao, coffee, cloves, nutmegs, bananas, maize, rice, ground nuts, sisal hemp, and other fibre plants are also in progress. Limes and tobacco too, it is stated, are under consideration as possible crops.

The total area of Crown land in the colony is estimated at 32,600 acres.

EDITORIAL NOTICES.

Letters and matter for publication, as well as all specimens for naming, should be addressed to the Commissioner, Imperial Department of Agriculture, Barbados.

All applications for Copies of the 'Agricultural News' should be addressed to the Agents, and not to the Department.

Local Agents: Messrs. Bowen & Sons, Bridgetown, Barbados. *London Agents:* Messrs. Dulau & Co., 37, Soho Square, W., and The West India Committee, 15, Seething Lane, E.C. A complete list of Agents will be found on page 3 of the cover.

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NOTES AND COMMENTS.

Contents of Present Issue.

The editorial (which has been contributed by Dr. Longfield Smith) deals with the courses of instruction in Natural and Agricultural Science given at Harrison College, Barbados.

Some interesting notes on Experiment Stations, and the efforts made to improve agricultural conditions in the tropical territories of the United States will be found on page 403. These are followed by a brief article on the Soy Bean.

The results of an exhaustive investigation, carried out by the U. S. Department of Agriculture, on the decay of oranges in transit, show that mechanical injuries to the fruit were in large part responsible for the subsequent decay (page 404).

A number of fibres from the Gold Coast have been well reported on at the Imperial Institute (page 405).

The value of certain leguminous plants as agents for the improvement of the soil, when under-planted in cacao and rubber plantations, is discussed on page 407.

A successful Peasants' Agricultural Show was lately held at Barbados (page 409).

Particulars relating to the 'fruit flies' of different countries will be found under Insect Notes (page 410). Attention may also be drawn to the article on page 415 'New Rubber Plants for the West Indies.'

Experiments in Molasses Feeding.

The results of experiments carried out in Germany as to the amounts of molasses that may with advantage be fed to horses and cattle are worthy of notice. For cattle it was found that 6 lb. of molasses per 1,000 lb. live weight is probably the maximum daily allowance that should be given, although 8 lb. were fed without evil effects. Horses doing considerable work were fed with molasses with encouraging results, the ration being mixed in the proportion of 7½ lb. of corn, 7 lb. of bran, and 5 lb. of molasses. It was noticed that on this diet horses perspired very little during hot weather. Even when 10 lb. of molasses per day were given to the horses, no evil effects were noticeable, but some difficulty was experienced in getting the animals accustomed to it.

Destruction of Scale Insects at St. Lucia.

Experiments carried out at St. Lucia to test the effectiveness of different strengths of kerosene wash for the destruction of the orange snow scale (*Chionaspis citri*) are described in the latest *Annual Report* of the Agricultural Superintendent of the colony.

The stock solution of wash consisted of 1 gallon of kerosene, 2 lb. whale-oil soap, and 1 gallon of water. Six lime trees infested with scale were sprayed with the wash at different strengths,—1, 2, 3, 4, 5, and 6 gallons of water being added respectively, for the different trees, to the stock solution given above. The results show that when only 1, 2, or 3 gallons of water are added to the original preparation, the wash is thoroughly effective. When the stock solution is diluted with 4, 5, or 6 gallons of water, satisfactory results may be expected in spraying on a large scale, more especially if a second spraying is given about ten days after the first.

The lime trees suffered no injury as the result of spraying even with the strong stock solution.

West African Rams and their Progeny.

It is apparent that a good deal of interest is being taken by stock-keepers and others in the several colonies in the four West African rams recently imported by the Imperial Department of Agriculture. One of the rams was purchased by a large sheep owner in St. Vincent and another has just been sold to an estate owner in Barbados. The other two are on service, one at the Stock Farm at the Agricultural School, St. Lucia, and the other at the Lunatic Asylum Farm, Barbados, principally for the benefit of peasant proprietors.

During the current year an estate proprietor who had the service of one of these rams for his flock has been very successful in raising some exceptionally fine lambs, most of which he has disposed of for shipment to the other islands. He states that he expects to have several more for sale early in the coming year.

The lambs bred from a good Barbadian woolless sheep, as the result of a cross with one of the African rams, show considerable improvement, and grow much quicker than those from the ordinary ram that is generally used, while the prices that can be obtained for such lambs are much higher.

Destruction of Injurious Insects.

A notice lately published in the *Trinidad Royal Gazette* invites school teachers and children in the colony to co-operate with the Board of Agriculture in the destruction of injurious insects. The pest to which attention is particularly drawn is the larger moth borer of the sugar-cane (*Castnia licus*), also known in Trinidad as the 'cane-sucker.' This insect is a native of South and Central America, and so far has not reached farther north in the West Indian islands than Trinidad. The larva of *Castnia licus* is a borer in the stems of the sugar-cane and also the banana. In certain districts of Trinidad the moth is very plentiful, and as many as 300 were recently caught on the Caroni estate. The Board of Agriculture offers to pay school children at the rate of $1·00 per 100 moths sent in to the Secretary.

Cacao at St. Kitt's-Nevis.

Cacao cultivation has been started on at least two estates at St. Kitt's, and at Molineux estate 22 acres have been planted with the crop. Some of the earlier-planted trees bore a few fruits in the past season. A further 10 acres have been prepared for cacao, and trees planted for wind-breaks, before the young cacao is put in. It is hoped in time to extend the cultivation to 100 acres on this estate, but it is necessary to provide belts of trees as wind-breaks beforehand. Large numbers of Castilloa and Funtumia rubber trees have been planted at Molineux, and advantage is being taken of their presence to utilize them for purposes of shade, and as wind-breaks for young cacao.

About 40 acres are also under cultivation with cacao at Maddens estate in Nevis. The older trees are now beginning to bear, and the area is being extended.

Rubber Exhibits from Dominica.

Among the samples sent from Dominica to the International Rubber Exhibition held in London from September 14 to 26 last, were specimens of Para, Castilloa, and Ficus rubbers, prepared in biscuit form. A report from Messrs. Lewis & Peat, rubber brokers of London, on the quality and value of these Dominica samples, is very satisfactory.

The biscuits of Para rubber are described as being well prepared and in good condition. They were valued at about 4*s.* 3*d.* per lb. It is added that the specimens compare favourably with biscuit rubber from Ceylon.

The biscuits of Castilloa rubber sent from Dominica were strong and well prepared. It was pointed out, however, that the biscuits should be rolled thinner. They should not be exposed to the sun or bright light, but cured in a darkened drying room. The value of the Castilloa sample was about 3*s.* 6*d.* per lb.

A single small biscuit of Ficus rubber is described by Messrs. Lewis & Peat as being extremely well cured and in good condition. There would be a ready demand for Ficus rubber prepared in biscuit form. The value of the sample was about 3*s.* 9*d.* per lb.

A ball of rubber, twelve years old, from the vine *Forsteronia floribunda*, of fair quality, was valued at from 2*s.* 4*d.* to 2*s.* 6*d.* per lb.

Artificial Manures in Italy.

The increasing quantities of artificial manures prepared in Italy, or imported from abroad, bear witness to the greater attention that has lately been given to the improvement of agriculture in that country.

The production of superphosphate in Italy in 1904 was estimated at 400,000 tons: in 1906, it had advanced to 600,000 tons, and in 1907, to 850,000 tons. The utilization, as well as the production of this manure in the country has doubled in the last four years.

Sulphate of ammonia is another manure manufactured on an increasing scale in Italy. The present production is over 10,000 tons. Organic nitrogenous manures are also prepared and utilized in large quantity.

About 100,000 tons of basic slag are imported from other European countries, while nitrate of soda to the extent of 42,000 tons is obtained from Chili.

Agricultural Show at Barbados.

The annual Barbados Peasants' Show of agricultural produce and live stock, held under the auspices of the Imperial Department of Agriculture, took place at Mount Plantation, St. George, on December 9, and was a distinctly successful event.

The district in which the Show was held was one which suffered least from the drought of the past season, so that the exhibits were well up to the standard of past years, and on the whole, the exhibition was adjudged to be the best of the series that has been held, as regards the quality of produce sent in.

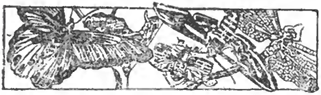
The vegetables and garden produce formed a good collection, coming principally from the parish of St. George. As usual, the best samples of fruit (oranges, grape-fruit, shaddocks, bananas, etc.) were from St. Thomas and St. Joseph. Some good specimens of grafted mangos were also sent in.

The exhibition of live stock (bulls, cows, goats and sheep) was a prominent feature of the Show, and here a distinct advance was noticeable compared with the exhibitions of past years. A goat to which was awarded first prize together with a Diploma of Merit was the son of the Toggenburg Billy 'Bruce,' imported some years ago by the Imperial Department of Agriculture. Some fowls of the Plymouth Rock and Buff Cochin China breeds were best among the poultry on view.

The number of exhibits from elementary schools was 133, and the quality of the best among these bore evidence to the good results of the agricultural teaching given, and to the interest taken by the pupils in the work.

The prizes were distributed by his Excellency Sir Gilbert Carter, K.C.M.G., and Lady Carter presented the Diplomas of Merit.

Professor d'Albuquerque, Acting Commissioner of Agriculture, in his speech, referred to the general good quality of the exhibits, and mentioned several which were especially worthy of note. Reference was made to the absence of Sir Daniel Morris, and also to that of Mr. F. M. Alleyne, both of whom had always been present at past shows.



INSECT NOTES.

Fruit Flies.

Fruit flies are serious pests in a number of countries, and they have been the subject of many scientific and popular articles, and also the cause of a certain amount of legislation.

The fruit fly of South Africa is *Ceratitis capitata*, that of Australia is *Dacus tryoni*, while the Mexican fruit fly or 'orange worm' is *Trypeta ludens*. It will be seen from these different scientific names that several distinct insects are known by the same common name on account of the nature of the injury they inflict upon fruit.

The South African fruit fly is known in the fruit-growing localities of the Mediterranean, in Madeira, and St. Helena, and is the one that has appeared at Bermuda.

These insects all affect fruit in the same way; that is, the adult female deposits its eggs in the developing fruit, where they hatch, and the maggots feed on the tissues of the fruit, which they completely spoil.

Many remedies having for their object the control or extermination of the fruit flies have been tried. One of the first steps that should be taken in case of any attack by these pests is the destruction of all fallen fruit as soon as possible after it has dropped. In this way many maggots are destroyed. Sprays of 'poison sweets' have also been tried. These sprays are really poison baits on which the adult flies feed, and by which they are killed.

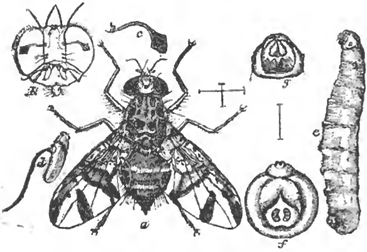


Fig. 16. Ceratitis capitata.

a, adult fly; *e*, larva; both enlarged.

(Reproduced from *Yearbook* of U. S. Department of Agriculture, 1897, p. 537.)

In Bermuda, a law was enacted making it compulsory for owners of fruit trees to destroy all fruit which showed the slightest infestation, and all fruit trees were subjected to a severe pruning with the object of preventing them from fruiting throughout one season, so that the food supply of the flies should be stopped. Kerosene was used as a trap also in Bermuda, and considerable success was reported in catching the flies in shallow trays of kerosene, exposed in and about the fruit trees. In Australia and South Africa the trials of kerosene in this way do not appear to have given such good results as are reported from Bermuda.

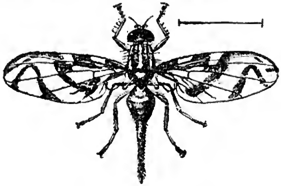


Fig. 17. Trypeta ludens. Female fly (enlarged).

(Reproduced from *Yearbook* of U. S. Department of Agriculture, 1897, p. 532.)

The use of netting to prevent the flies from gaining access to the growing fruit has been successful in extended trials in South Africa.

In certain districts of Mexico, the system has been adopted of injecting each infested orange (for the orange is the fruit principally attacked) with kerosene, by means of a small syringe.

The fruit fly is not known as a pest in the Lesser Antilles, although several closely related species have been recorded from these islands. Planters and others, however, often write to the Head Office of the Imperial Department of Agriculture, to inquire about the fruit fly—what it is, and what it does. Letters are frequently accompanied by specimens of some insect pest attacking a fruit crop, and enquiry is made as to whether this insect is a specimen of the fruit fly.

It may be pointed out that if it is borne in mind that the fruit flies are small two-winged insects, that their larvae are maggots, without a distinct head, and without feet and legs, planters and fruit growers might save themselves much needless worry and annoyance.

The illustrations accompanying this article will serve to give an idea of the appearance of two species of the pests in question. There are certain small flies abundant in these islands which might be mistaken for fruit flies, except that it will be found that they only attack over-ripe or decaying fruit. These are the Pomace flies (*Drosophila* spp.). The Pomace flies may be seen hovering about over-ripe or decaying fruit, and an examination of the fruit will usually disclose enormous numbers of the small maggots.

In nearly all these islands, too, there is to be found a handsome butterfly (*Didonia biblis*) which has already been mentioned in the *Agricultural News* (see Vol. VII, p. 234) as a pest attacking ripe fruit in Dominica and St. Kitt's-Nevis. In this case, the injury is due to the adult insect, which punctures the fruit with the proboscis. The puncture is the point at which decay sets in. This form of injury is not the work of the fruit fly.

In the event of any attack of insects on ripe or ripening fruit, the circumstance should be reported at once, with all the information available, and a good supply of specimens sent to the Head Office of the Imperial Department of Agriculture.

STUDENTS' CORNER.

Seasonal Notes.

December.

2nd Fortnight.

Look for evidence of root fungus in plant and ratoon canes: also for evidence of rind fungus. Notice the 'dead-hearts' caused by moth borers, and observe that cutting them out checks the pest. Search for the eggs of the borer moth.

Study the questions of cultivating and manuring cacao; and make a special study of local conditions in the light of the experiments of the Imperial Department of Agriculture, carried out at Dominica, St. Lucia, and Grenada.

Give attention to the questions of cultivating and manuring lime trees; ascertain what amount of digging or forking is expedient. Observe the effects of wind-breaks or shelter on the spread of scale insects.

Practise the examination of cotton for length, strength, and fineness. Put together notes on the yield of cotton from various fields, and endeavour to account for differences observed.

Questions for Candidates.

PRELIMINARY QUESTIONS.

(1) Lime is frequently applied to fields: what action does it have? Give details as to the manner in which you would use lime.

(2) Why is it necessary to plough or otherwise stir up soil that is to be used for the growth of agricultural crops? What objects are attained?

(3) Describe the best methods of retaining moisture in soil during periods of dry weather.

INTERMEDIATE QUESTIONS.

(1) Describe the principal manures useful as providing phosphates.

(2) Describe a plough, and state how it should be modified, so as to be suited for the various types of soil to be worked.

(3) In what respect does a surface soil usually differ from the subsoil.

PROFITABLE AND UNPROFITABLE CULTIVATIONS.

The conditions which determine the profitable nature or otherwise of the cultivation of various agricultural crops are dealt with in a late number of the *Hawaiian Forester and Agriculturist*, and it is pointed out that the prosperous nature of any agricultural industry depends upon an increasing consumption of the article produced, favourable labour facilities, and a restricted area of cultivation. Generally speaking when these three elements are all present, an agricultural enterprise has every likelihood of succeeding.

Established articles of food, as wheat, sugar, tea, etc., are likely to prove profitable, and this is more especially true when the article of diet in question has a wide market, but its production requires special conditions of climate which limit its growth to restricted areas.

Another class of flourishing agricultural enterprises whose future is equally as promising as that of the food-stuffs alluded to, is represented by such industries as the production of tobacco, rubber, and camphor, which have especially limited areas of production.

On the other hand, the cultivation of drugs and medicinal herbs is an industry which, on an extensive scale, is always likely to prove unremunerative. An example of this was shown by the failure to create a profitable industry in the growth of ginseng in the United States. Another illustration of the misfortune apt to overcome the grower of medicinal plants is furnished by the result of the efforts made to grow cinchona in California some years ago. The extensive use of quinine and its good market value encouraged extensive plantings in favourable districts. The plants did not flourish, however, and the rapid decline that has taken place in the price of quinine renders it certain that, taking into consideration the cost of labour, the industry would have been unremunerative.

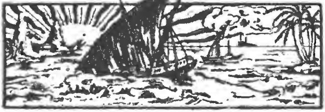
Another class of industries referred to, which have of late become increasingly unprofitable is the cultivation of perfumery plants. This is chiefly because the natural perfume has been replaced by synthetic articles manufactured in the chemical laboratory.

PRIZE-HOLDINGS COMPETITIONS AND VILLAGE SHOWS AT GRENADA.

The improvement that has been brought about in the management and cultivation of peasant holdings in those districts of Grenada in which the Prize-holdings Competitions have been held is generally recognized, and it is desirable that the good influence of these competitions be extended throughout the island. If this is to be done, however, increased financial support from the Agricultural Society is necessary, and the *Grenada Chronicle* in its issue of November 28 last, dealing with this question, suggests that the Agricultural Society should adopt a resolution, urging the Secretary of State to increase the grant to the Society to £500, which would furnish the means of additional aid to the Prize-holdings Competitions, and also to Village Agricultural Shows.

The following is quoted from the *Chronicle*:—

> A grant of £500 would enable the Society to extend the Prize-holdings Competitions to all the parishes. The six competitions at £25 each would absorb £150. Ten Village Competitive Shows, confined to peasants, and at which prizes will be offered for forking, pruning, and draining competitions, should be held annually, to each of which the Society would contribute £10. The sum of £25 might, with considerable advantage, be distributed in small prizes for the best ground provisions and vegetables offered for sale in the markets. The upkeep of the Society would, as at present, absorb £100; Foreign Exhibitions, £50; agricultural literature for free distribution, £25; experiments and contingencies, etc, £50.
>
> We are convinced that £500, expended as we have suggested above, would give an immediate return, as it would supply excellent incentives to the peasantry to apply to their holdings the improved methods of agriculture in use on our best cultivated estates. Past results provide ample guarantees, that the money would be properly expended by the Society, and that the return will be immediate and abundant.



GLEANINGS.

The Barbados Agricultural Society has just imported from England a Catalonian jack donkey, 14·2 hands high, to be used for mule-breeding purposes in the island.

A fine Berkshire boar 'Homestead Hero' has been added to the pedigree stock kept at the Agricultural School, Union, St. Lucia. The fee for service is 1*s*.

Attention is drawn to the advertisement—which appears on the last page of the cover of this issue—of an aermotor offered for sale at Tortola.

St. Lucia exported 3,700 bags of molascuit in 1907. Of this quantity, nearly 2,000 bags went to the United Kingdom, and 1,725 bags were shipped to France.

A bulletin (*No. 26*) has been issued from the Hawaiian Sugar Planters' Experiment Station dealing with the nomenclature of the many varieties of sugar-cane now in cultivation. Lists of synonymous canes are given, and the origin of the better-known varieties is discussed.

The value of the salt exported from the Turks and Caicos Islands shows a rise from £14,275 in 1906 to £16,557 in 1907. A prolonged drought was experienced, which was favourable to salt-raking, but disastrous to the sisal crop. The latter fell in value from £5,602 in 1906 to £3,107 in 1907.

For the encouragement and instruction of bee-keepers, the Bavarian Ministry of the Interior have lately established a model apiary in connexion with the Zoological Department of Erlangen University. The officials controlling the management of the apiary provide gratis information, both scientific and practical, on all questions dealing with the subject.

The cultivation of cocoa-nuts appears to be an industry deserving more attention than it at present receives in the Bahamas Islands. During 1907, the value of the cocoa-nut exports was £710. The crop is reasonably certain in many districts, and the demand is good. (*Board of Agriculture, 1907.*)

Arrangements have been made by the Governor of Uganda to introduce a supply of the small Barbados fish known as 'millions' into the fresh water streams, etc., of the Protectorate, in the hope that by destroying the larvae of mosquitos, the fish will prove of valuable assistance in decreasing the prevalence of certain diseases.

Messrs. Macfarlane Junior & Co.'s cotton ginnery at Castries, St. Lucia, has lately started operations. The building at present contains two Asa Lee gins worked by a Crossley oil engine, but more gins will be added as required. Sixty acres have been planted with cotton on the Balembouche estate, from which the first pickings have been made. (*Voice of St. Lucia.*)

The tenth Colonial Fruit Show, under the auspices of the Royal Horticultural Society, was held in London from November 26-30 last. There was a good display of West Indian produce. A paper on the cultivation of citrus fruits, prepared by Mr. Archibald Brooks, of the Dominica Agricultural School, was read at the Exhibition on November 26.

The British Guiana correspondent of the *West India Committee Circular* states that an American syndicate has purchased 5,000 acres of land on the West Coast of Berbice, on which it is proposed to carry out rice growing by up-to-date methods, similar to those practised in the Southern States of America.

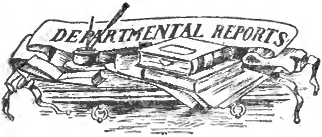
Bananas form the chief product of the province of Bocas del Toro (Panama). In 1907 the value of the fruit exported was £227,664, practically the whole of which went to the United States. Sarsaparilla was exported to the value of £2,836, together with rubber worth £1,667. Cacao, cocoa-nuts, and sugar-cane are grown on a small scale by the natives.

The French Colonial Cotton-growing Association exists for the purpose of encouraging cotton production in French colonies. In 1907 cotton to the extent of 150 tons, grown in the dependencies of the country, was imported by the Association. Among the colonies in which attention is given to cotton growing are Algeria, Guadeloupe, Martinique, Madagascar, Réunion, and Dahomey. (*Board of Trade Journal.*)

The cropping powers of thirty-seven varieties of cowpeas were tested at the Delaware Agricultural Experiment Station during the last season. The New Era, Whip-poor Will, and Warren New Hybrid were the leading varieties in seed production, yielding 15·6, 13·2, and 12·3 bushels per acre respectively. The New Era, Whip-poor-Will, Red Crowder, and Iron peas made the best growth. (*Experiment Station Record.*)

An article in a late number of the *Chemical Trade Journal* discusses the method of manufacture of calcium cyanamide (see last issue of *Agricultural News*, page 398), and the cost of this, as compared with other nitrogenous manures. It is stated that the factory at Odda, Norway, will shortly be able to place the cyanamide on the English market at a price about 10*s*. per ton cheaper than the cost of sulphate of ammonia containing the same amount of nitrogen.

From the preliminary returns of the Board of Agriculture and Fisheries, it is seen that the chief crops of Great Britain show a decline in the past season as compared with those of the previous year. The wheat crop has fallen from 6,900,774 quarters in 1907 to 6,565,370 quarters in 1908, while oats have declined from 16,799,015 quarters in 1907 to 15,467,616 quarters in 1908. The total amount of hay produced in the past summer was 9,721,899 tons, while in 1907 it was 10,429,234 tons.



ST. KITT'S-NEVIS: ANNUAL REPORTS ON THE BOTANIC STATION, ECONOMIC EXPERIMENTS, AND AGRICULTURAL INSTRUCTION, 1907-8.

A total amount of £1,076 8*s*. 1*d*. was expended on agricultural services at St. Kitt's-Nevis in the year under review. Of this sum, £254 13*s*. 8*d*. were spent on sugar-cane, cotton, and other experiments. The total receipts from the sale of seeds, plants, and produce amounted to £169 2*s*. 9*d*.

Some minor improvements have been made at the St. Kitt's Botanic Station during the year. A considerable decline in the number of plants sent out is noticeable, there being but 564 distributed (including 310 *Castilloa elastica*), compared with 1,038 in the previous year. Cuttings and seeds of various kinds have, however, been distributed in large quantity to planters and others in the presidency.

Small but promising areas of cacao exist both at St. Kitt's and at Nevis, and preparations have been made for extending the area at Molineux estate, St. Kitt's, and at Muddens estate, Nevis. From 4,000 to 5,000 rubber trees have now been planted at Molineux, and these provide shelter, and serve as a wind-break for the young cacao.

The rainfall experienced at the Botanic Station was but 40·90 inches, i.e., 12·49 inches below that of last year, and 3 inches below the average of the past six years.

Among the crops under experimental cultivation on the economic plots at La Guerite are sweet potatos, yams, cassava, onions, ground nuts, tobacco, eddos, pigeon peas, velvet beans, and woolly pyrol.

An area of 6½ acres at La Guerite is devoted to experiments with cotton, and the work includes manurial trials, experiments as to the most suitable months and the best distances for planting, as well as seed selection. A total of 1,883 lb. of lint was shipped from the 6½ acres.

The total area under cotton cultivation at St. Kitt's-Nevis (including Anguilla) during 1907-8 was about 5,000 acres. Compared with the previous year, there was an increase of 500 acres under cotton at St. Kitt's, and a decrease, amounting to about the same area, at Nevis. The return of lint per acre varied very much, but the average for St. Kitt's was no more than 130 lb. per acre.

The sugar-cane experiments will, as usual, form the subject of a separate report. It may be mentioned, however, that returns sent in from forty-three estates at St. Kitt's show that out of a total of 7,506 acres under cane, no less than 5,314 acres are planted with newer varieties of cane, introduced and tested in these experiments.

A branch Experiment Station exists at Nevis. On this a sum of £199 19*s*. 7*d*. was expended during the year, while £11 4*s*. was derived from the sale of plants and produce.

The experiments carried out at the Station include those with different varieties of provision crops, as yams, potatos, and cassava; also with Sea Island cotton, broom corn, castor oil, and ground nuts.

From the plot of land kept as a lime nursery, 3,600 lime plants were sold during the year.

As already mentioned, the cotton area of Nevis showed a decline compared with the previous year, but owing to the greater care taken with the cultivations, a considerable yield of lint per acre was obtained.

FEDERATED MALAY STATES: REPORT OF DIRECTOR OF AGRICULTURE, 1907.

The report of Mr. J. B. Carruthers, Director of Agriculture and Government Botanist to the Federated Malay States, on the progress made in 1907, contains many points of interest, more especially in regard to the development of the rubber industry.

At the end of 1906, the rubber area of the Federated Malay States was 85,000 acres, and by the end of 1907 it had advanced to 126,235 acres, showing an increase of about 48 per cent. The total number of rubber trees planted, which was less than 11,000,000 in 1906, had reached nearly 20,000,000 by the end of 1907. On land recently put under rubber cultivation, the trees, in many cases, have been planted more closely than was previously the custom. The output of dry rubber shows a corresponding increase, 885 tons being exported from the Federated Malay States in 1907, as compared with 459 tons in 1906—an advance of 93 per cent. The wonderful rapidity with which the rubber industry has developed will be realized when it is mentioned that ten years ago only 350 acres were planted, and in 1902 no more than 7,500 acres were under rubber trees.

The average amount of dry rubber obtained per tree over the whole peninsula during 1907 was 1 lb. 12 oz. This is very satisfactory, as large numbers of trees were tapped for the first time only. The fall in price of rubber somewhat diminished the rapidity with which planting was being carried on, but it is mentioned that even the lowest price yet reached by plantation rubber is 100 per cent. above the cost of production.

Owing to the high cost of keeping rubber plantations free from weed, it is recommended that planters should give a trial to three quick-growing leguminous plants—*Crotolaria striata*, *Mimosa pudica*, and *Desmodium triflorum*, which rapidly cover the soil, keep down weeds, and increase the fertility of the land by their nitrogen-assimilating properties.

Cocoa-nuts come second to rubber as regards the area planted in the Malay States. The cocoa-nut plantations cover 112,560 acres, including about 7,500 acres planted up in 1907. The drop in the price of rubber has lately tended to create an increased interest in this easily cultivated and remunerative crop.

The coffee area of the Malay States extends to nearly 11,000 acres, but a considerable proportion of the trees are interplanted with rubber, and owing to the dense shade of the latter, give little return. Cassava occupies about 10,000 acres, and is a profitable crop.

A good deal of attention is being paid to improvement of methods of rice cultivation. On certain areas, it is stated, the crop has been increased from 30 to 40 per cent. by the introduction of irrigation.

An Experiment Station has lately been established on a block of land, about 100 acres in extent, near the Department laboratories and offices, and a number of carefully planned experiments started with various crops.

The reports of the Government Mycologist, Inspector of Cocoa-nut Plantations, and the Superintendent of Experiment Plantations are also included with that of the Director of Agriculture.

DRY FARMING IN THE UNITED STATES.

What is known as 'Dry Farming,' i.e., the cultivation and utilization for agricultural purposes, of land which enjoys but a very small rainfall, has been successfully adopted in California and other parts of America, and it has been shown that when the system is carried out in the most approved methods, and on suitable soil, a crop may be obtained once in two years, with a rainfall of no more than 10 to 12 inches per annum. The possibility of dry farming depends essentially upon the soil being kept in such a condition that its capacity for water storage is at a maximum, while evaporation is reduced to a minimum. It will be seen, therefore, that the methods followed in economising the rainfall should be of interest to West Indian planters, whose lands in many districts, are not infrequently subject to drought. The following brief account of the system is summarized from a report on the subject, prepared by the Surveyor-General of South Australia, and reprinted in the *Agricultural Journal* of the Cape of Good Hope for June last :—

The soil from which the most satisfactory results may be expected under a dry-farming system is a fine, deep sandy loam. It is much to be doubted if heavy clay lands can be worked in this way, and it is certainly impossible to get good results under the system from shallow soil overlying loose gravel subsoil.

To farm successfully with a very light rainfall, only one crop in two years should be taken. During the remainder of the time, the land lies fallow, and should be kept entirely free from weeds, the surface soil, to a depth of 3 inches, being frequently stirred by harrowing.

As soon as practicable after a crop has been taken off, the land should be disced or lightly ploughed, and as much as possible of the roots or stubble of the old crop turned into the soil. This increases the humus content of the soil, and therefore assists its water-holding capacity. Harrowing follows quickly after this shallow ploughing, and by frequent use of the harrow, a surface mulch of dry soil is regularly maintained, and all weeds are kept down. This last point is one of importance, since weeds, by the moisture they transpire, rob the soil of a considerable amount of water. Harrowing is especially important after rainfall, in order to prevent the surface from caking as it becomes dry, a condition especially favourable to rapid evaporation.

Although it is important, in this system of dry farming, that the soil should not be in too loose a state, yet, in order to retain as much moisture as possible, it is essential that it be loosened to a good depth, in order that the rainfall received may readily soak into the land. At least one deep ploughing is therefore necessary early in the period of fallowing. This ploughing should never be less than 7 inches deep, and on firm land of good depth, the ploughing may reach to 9 or 10 inches. The best time for this ploughing is when the land is damp, but not wet. If rain has followed the preliminary light discing given when the crop was taken off, it readily soaks in, the subsoil is moist, and conditions are then very favourable for the deep ploughing to be given at once.

Fineness and closeness of grain is as essential as depth in soils which are utilized for dry-farming purposes, for these properties are among the chief points which determine the water holding capacity of the land. To be retentive the soil must be finely pulverized, and in a firm condition. If there is any tendency to be loose, therefore, the soil must be 'packed.' The best means of bringing about this condition is by the use of a heavy weighted harrow, or a roller followed by a light harrow.

The best seed only should be sown in a dry country, and this should preferably be the produce of a crop grown in a similarly dry climate. Experience has shown that thin sowing is the best under the conditions ; thick sowing has proved unsuccessful in dry climates.

THE VALUE OF RECORDS.

The value of keeping accurate records in connexion with the various operations of estate work, was discussed in the editorial article of the *Agricultural News* of October 3 last. Reference is made to this question in a recent number of the *Louisiana Planter*, and some of the ideas suggested in the above-mentioned article are followed up, more especially from the point of view of sugar planters in Louisiana.

The fact that the practice of purchasing canes by weight is a recent introduction, is referred to, and the benefits that have followed this introduction are enumerated. With the weighing of the sugar-cane, there came the knowledge of the relative yields of plant canes, of first ratoons, and of second ratoons, all of which are ordinarily produced in Louisiana. There came also a direct knowledge of the relative yields of loamy lands, and of stiff lands, as well as of the relative yields of lands at higher and lower levels.

As an illustration in point it is mentioned that a successful sugar planter, who has only lately started weighing his canes, was surprised to find, on beginning the practice, that one section of his estate was giving quite inadequate returns, although this had been masked by the average of profit obtained over the whole property. Special attention has since been paid to the unprofitable area.

Reference is made to certain problems lately presented by cane roller mills, which can only be solved by careful accumulation and comparison of data. The relatively profitable nature of six-roller, nine-roller, and twelve-roller mills are among the problems that await solution. Some studies made in Hawaii show no very great increase in the profit when the results from twelve-roller mills were compared with those from nine-roller mills.

Many seedling and other new varieties of cane have been introduced into Louisiana, and their merits compared with the other standard kinds. Trials carried out on every estate to determine the weight of produce per acre and the quality of the juice, are methods of comparison which at once suggest themselves, and may be readily put into practice. The influence of climatic conditions on the growth of these canes is believed by some to be very considerable, and here again is a question which can only be satisfactorily disposed of by observation and careful record keeping.

Another important phase of the sugar-cane industry which can best be studied by the weighing of canes and the keeping of records, is that of ratooning. In Java, local conditions (chiefly the danger of root disease) have led to the cultivation of plant canes only, ratooning having been entirely given up. In some parts of the West Indies, annual replanting is also practised, while in Cuba a crop of plant canes is followed by three or four crops of ratoons.

In Louisiana, under general conditions, the crop of plant canes is the heaviest. The crop of first ratoons will scarcely average three-fourths by weight of the plant cane yield, and the second ratoons scarcely weigh two-thirds as much as the first ratoons. These facts have been brought out by weighing canes and keeping records.

FORSTERONIA RUBBER FROM JAMAICA.

A report recently obtained from the Imperial Institute on a sample of rubber prepared in Jamaica from the vine *Forsteronia floribunda* leaves no doubt that the rubber furnished by this vine is of good quality, and if obtainable in quantity, would be readily saleable.

The Forsteronia plant grows profusely in the limestone districts of Jamaica, and it was desirable therefore that the commercial value of the rubber produced from the latex of the vine should be known. The sample of rubber sent to London weighed about 13 oz., and consisted of two small sheets and one larger cake of rubber. The report issued by the Imperial Institute states that the rubber was clean, free from stickiness, and exhibited satisfactory physical properties. The results of analysis showed that it was of good quality, the dry material containing nearly 89 per cent. of true rubber. Resin was present to the extent of 7·1 per cent.

The rubber was submitted for commercial examination to brokers who reported that it would probably realize 2*s.* 4*d.* per lb. in London with fine hard Para from South America quoted at 3*s.* 5½*d.* per lb.

NEW RUBBER PLANTS FOR THE WEST INDIES.

Reference was made in the *Agricultural News* of November 30, 1907 (Vol. VI, p. 383), to the rubber-yielding tree known as Jiquié Maniçoba, which occurs naturally in large quantity in the Brazilian State of Bahia. This plant belongs to the same genus (*Manihot*) as the well-known Ceara rubber tree, and the name *Manihot dichotoma*, Ule, has been given to it. From further information it appears that at least two other valuable species of Manihot are found in Bahia and in the adjoining state of Piauhy. To these, the names *M. piauhyensis* and *M. heptaphylla*, respectively, have been given. Seeds of these new rubber plants were sent to Kew Gardens, from which seedlings have been raised and distributed to portions of the Empire within the tropics. A lengthy article dealing with the three species was published in the *Kew Bulletin*, No. 2, 1908.

The Imperial Commissioner of Agriculture recently received from Kew a consignment of seeds of both *M. dichotoma* and *M. piauhyensis*, and these will be sent out to the various Botanic Stations with the object of testing the suitability of the two species for economic cultivation in the West Indies. It seems likely that these new varieties will prove of considerable importance in the future, and some notes on their characteristics, therefore, may well be given.

Manihot dichotoma (Jiquié Maniçoba) does not form quite so large a tree as the Ceara, and is from 16 to 38 feet in height. The stem also does not become so thick, and the bark is thinner, and usually paler. The leaves are 3- 5-partite, and are much smaller than in the case of the Ceara. The smaller leaves and the large, long seeds afford the most important characters for distinguishing this species from *M. Glaziovii.*

The 'Jiquié' occurs more or less plentifully among the forest growth, on mountain slopes in the south-east of Bahia. It thrives best on red, loamy soil, and is found more rarely on sandy soil. Dr. Ule, a German botanist, reports that in some parts the 'Jiquié' trees constitute 50 per cent. of the forest. It seems probable, however, that the wild supply will soon be exhausted. It has been found from experiment that trees of *M. dichotoma* can be made to yield their latex at from four to five years from planting, but that the maximum return is obtained from the age of eight years onwards.

Manihot piauhyensis is a tree with a short stem (no more than from 8-16 feet in height), but with a broad, densely-leaved crown, the branches being forked two or three times. This species is found in the State of Piauhy, and grows on the sandstone mountain ranges. The bark of *M. piauhyensis* is not so hard as that of the Ceara. In collecting rubber from the above two trees, the stem is cut in a wavy line by means of a knife, which is curved or rounded at the apex, and a small metal cup is placed at the end of the cut into which the latex runs. The latex begins to coagulate as soon as collected, and is then pressed by hand into balls, which are afterwards compressed in cylinders and well dried. The total output of rubber at present obtained from the wild growth of *M. dichotoma* amounts to over 400 tons, and from *M. piauhyensis* at considerably over 500 tons. Plantations of the former variety have lately been made.

Rubber from *M. dichotoma* has been valued at from 8*s.* to 8*s.* 6*d.* per kilo. (2·2 lb.) and that from *M. Piauhyensis* at 7*s.* 6*d.* per kilo., at a time when Para rubber was quoted at 9*s.* per kilo.

Although the quality of the produce is not quite so good as that from *Hevea brasiliensis*, these new rubber trees are undoubtedly well worthy of cultivation, more especially in dry and less fertile districts. It is considered that both *M. dichotoma* and *M. piauhyensis* are likely to prove more profitable than Ceara rubber. They not only give a far higher yield of rubber, but their bark is thinner and not so hard, and they are less liable to injury in tapping. *M. dichotoma* is especially suitable for firm, loamy soil, and *M. piauhyensis* gives good results on light, sandy land.

EDUCATIVE VALUE OF SCHOOL GARDENING.

The place of school gardening in a system of education, and the aim of such teaching are considered in an article which appeared in a recent number of the *Tropical Agriculturist.* The writer emphasizes the fact, to which it is often necessary to make reference, that agricultural teaching and school gardening in elementary schools are primarily valuable on account of the training they afford in habits of observation, and the added interest they create in agricultural life and pursuits. The actual amount of knowledge gained by the pupils in regard to methods of cultivation is also of direct use, but the acquirement of such knowledge should not be the main aim of the work. From this point of view, therefore, school gardening should be regarded as an instrument of education—a means to an end, and not an end in itself.

In the article mentioned, it is urged that in any school in which nature teaching and gardening are taken up thoroughly they should form the main subject with children from six to nine years of age, and continue to occupy a prominent place with pupils of more advanced age.

The author describes the gardening work at his own school, in which the children are taken in small groups for work. It has been found that eight or ten children are as many as one teacher can direct advantageously, unless it be in such operations as weeding and watering. With a considerably larger number, the work becomes over-organized, and developes rather into drill than nature teaching.

MARKET REPORTS.

London,—December 8, 1908, The West India Committee Circular; Messrs. Kearton Piper & Co., December 8, 1908.

Arrowroot—Dull.

Balata—Sheet, 2/1 to 2/5; block, no quotations.

Bees'-wax—No quotations.

Cacao—Trinidad, 57/- to 70/- per cwt.; Grenada, 50/- to 59/- per cwt.

Coffee—Santos, 26*s.* per cwt.; Jamaica, no quotations.

Copra—West Indian, £18 10*s.* to £19 per ton.

Cotton—St. Vincent, 14*d.* to 15½*d.*, and Barbados 14*d.* to 15*d.*; West Indian Sea Island, good medium to medium fine, 6½*d.* to 15*d.*

Fruit—

- Bananas—Jamaica, 4/6 to 6/- per bunch.
- Limes—Not wanted.
- Pine-apples—St. Michael, 3/6 to 5/6.
- Grape Fruit—9/6 to 13/- per box.
- Oranges—Jamaica, 8/- to 10/6 per box.

Fustic—£3 to £4 per ton.

Ginger—Quiet.

Honey—17*s.* to 34*s.* per cwt.

Isinglass—West India lump, 1/9 to 2/4 per lb.

Lime Juice—Raw, 11*d.* to 1/2 per gallon; concentrated, £16 5*s.* per cask of 108 gallons; distilled oil, 1/9 per lb.; hand-pressed, 5/- to 5/6 per lb.

Logwood—£3 to £4 5*s.* per ton; roots, no quotations.

Mace—Steady.

Nutmegs—Steady.

Pimento—Quiet.

Rum—Jamaica, 3/4; Demerara, 1/6 to 1/7, proof. Trinidad, no quotations.

Sugar—Crystals, 15/6 to 16/9 per cwt; Muscovado, 12/-; Syrup, 12/- to 14/-; Molasses, no quotations.

New York,—November 27, 1908.—Messrs. Gillespie, Bros. & Co.

Cacao—Caracas, 12½c. to 14½c.; Grenada, 12c. to 12¾c.; Trinidad, 12½c. to 13¼c.; Jamaica, 9¾c. to 11¾c. per lb.

Cocoa-nuts—Jamaica, select, $24·00 to $25·00; culls, $13·00 to $15·00; Trinidad, $23·00 to $24·00; culls, $13·00 to $14·00 per M.

Coffee—Jamaica, ordinary, 7½c. to 8c.; good ordinary, 8½c.; washed, 9½c. to 11½c. per lb.

Ginger—10½c. to 15c. per lb.

Goat Skins—Jamaica, 53c.; Antigua and Barbados, from 49c. to 50c.; St. Thomas, St. Croix, St. Kitt's, 46c. to 48c. per lb., dry flint.

Grape Fruit—Florida, $4·00 to $5·00 per barrel.

Limes—No quotations. Market overstocked.

Mace—29c. to 33c. per lb.

Nutmegs—110's, 9¼c. per lb.

Oranges—Jamaica, $3·00 to $4·00 per barrel; $1·50 to $2·00 per box.

Pimento—4c. per lb.

Sugar—Centrifugals, 96°, 3·94c.; Muscovados, 89°, 3·44c.; Molasses, 89°, 3·19c. per lb., duty paid.

INTER-COLONIAL MARKETS.

Barbados,—Messrs. Leacock & Co., December 21, 1908; Messrs. T. S. Garraway & Co., December 21, 1908.

Arrowroot—St. Vincent, $4·00 to $4·10 per 100 lb.

Cacao—Dominica and St. Lucia, $10·00 to per 100 lb.

Cocoa-nuts—$13·00 for unhusked nuts.

Coffee—Jamaica and ordinary Rio, $8·00 to $9·50 per 100 lb.

Hay—$1·20 per 100 lb.

Manures—Nitrate of soda, $62·00 to $65·00; Ohlendorff's dissolved guano, $55·00; Cotton manure, $42·00; Cacao manure, $48·00; Sulphate of ammonia, $75·00; Sulphate of potash, $67·00 per ton.

Molasses—No quotations.

Onions—Strings, no quotations; loose, $2·00 per 100 lb.

Potatos—Nova Scotia, $1·22 to $1·60 per 160 lb.

Peas—Split, $6·59 per bag of 210 lb.; Canada, $3·55 to $3.35 per bag of 120 lb.

Rice—Ballam, $5·10 (180 lb.); Patna, $3·80; Rangoon, $3·00 per 100 lb.

Sugar—No quotations.

British Guiana,—Messrs. Wieting & Richter, December 12, 1908; Messrs. Sandbach, Parker & Co., December 12, 1908.

Arrowroot—St. Vincent, $9·00 per 200 lb.

Balata—Venezuela block, 32c.; Demerara sheet, 48c. per lb.

Cacao—Native, 16c. to 18c. per lb.

Cassava—80c.

Cassava Starch—$5·00 to $6·00 per barrel of 196 lb.

Cocoa-nuts—$12·00 to $16·00 per M.

Coffee—Creole, 12c. to 13c.; Jamaica, 11c. to 12c. per lb., slow.

Dhal—$4·80 per bag of 168 lb.

Eddoes—96c. per barrel.

Molasses—No quotations

Onions—Madeira, 2¼c. to 2½c: per lb

Plantains—12c. to 24c. per bunch, plentiful.

Potatos—Nova Scotia, $2·25 to $2·50 per 100 lb.

Potatos—Sweet, Barbados, $1·92 per bag.

Rice—Ballam, $5·90; Creole, $4·20 to $4·50; Seeta, $6·00.

Split Peas—$6·50 to $6·65 per bag (210 lb.); Marseilles, $4·50 to $5·00.

Tannias—$1·92 per bag.

Yams—White, $2·04; Buck, $2·16 per bag.

Sugar—Dark crystals, $2·20 to $2·30; Yellow, $2·60 to $3·10; White, $3·60 to $3·80; Molasses, $2·00 to $2·10 per 100 lb. (retail).

Timber—Greenheart, 32c. to 55c. per cubic foot.

Wallaba Shingles—$3·75 to $5·75 per M.

———Cordwood—$2·40 to $2·64 per ton.

Trinidad,—December 12, 1908.—Messrs. Gordon, Grant & Co.

Cacao—Venezuelan, $12·25 to $12·50 per fanega; Trinidad, $11·75 to $12·50.

Cocoa-nuts—No demand.

Cocoa-nut Oil—62c. per Imperial gallon, cask included.

Coffee—Venezuelan, 8¼c. to 8½c. per lb.

Copra—$3·00 to $3·10 per 100 lb.

Dhal—$4·60 to $4·75 per 2-bushel bag.

Onions—$2·00 to $2·25 per 100 lb. (retail).

Potatos—English, $1·00 to $1·10 per 100 lb.

Rice—Yellow, $5·40 to $5·60; White, $4·50 to $4·80 per bag.

Split Peas—$5·75 to $6·00 per bag.

Sugar—American crushed, $5·00 to $5·10 per 100 lb.

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AGRICULTURAL NEWS

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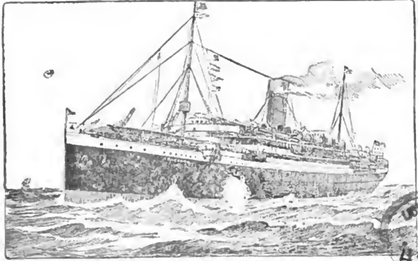

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